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FIELD SERVICE

MAJOR JAMES A. MOSS



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FIELD SERVICE

By
COLONEL JAMES A. MOSS
U. S. Army

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CHAPTER I

EQUIPMENT AND PERSONAL EFFECTS OF OFFICERS

1. General rules and principles. The following general rules and principles, based on experience, should be observed:

(1) While, on the one hand, one should not take into the field any unnecessary plunder, he should, on the other hand, always make himself as comfortable as possible, thus husbanding his nervous energy and physical strength. There is no sense in a man's subjecting himself to personal discomfort that can be avoided. Experience has shown that to undergo avoidable hardships does not enable one to stand unavoidable ones any better. Always make yourself as comfortable as circumstances will permit.

(2) Never, unless absolutely unavoidable, should you get separated even temporarily from your field equipment.

(3) Every officer should have a complete field equipment, the articles of bedding and toilet forming a permanent part thereof and not being gathered together every time he is ordered into the field. This equipment should always be packed and ready for instant use. Not only does this insure the certainty of the officer having his equipment complete when he takes the field, especially if ordered out unexpectedly, but it also enables him to attend better to other matters that always require attention at such a time. In this connection, Par. 36, Uniform Regulations states:

All officers will provide themselves with the uniforms, arms, and personal and horse equipments pertaining to their rank and duty, and maintain them thoroughly neat and serviceable. Commanding officers will inspect and verify the arms, service uniforms, and field equipments of officers and enlisted men as often as they may deem necessary and assure themselves that all members of their commands are prepared to take the field upon short notice, fully equipped and uniformed.

(4) Upon returning from field service, the equipment should always be given a thorough overhauling, being cleaned and sunned, the various articles being checked up and all that are worn or exhausted, replaced *at once*.

(A list of the articles belonging in the bedding roll should be pasted in some appropriate place on the interior of the roll. The

same should be done in the case of the clothing roll and the trunk locker, thus facilitating the checking.)

2. Articles to be taken into the field. The Tables of Organization fix the field baggage allowance of an officer at 50 pounds.¹ Just what articles of equipment and personal effects should, within the limits of the authorized baggage allowance, be taken into the field, in addition to those that an officer is required to carry, will, of course, depend upon circumstances, including personal taste, kind and amount of transportation available, the nature and probable duration of service, and climatic conditions.

3. Boxes or bundles for carrying equipment and personal effects. The personal baggage of officers when taking the field will be packed in boxes or bundles conforming to descriptions as follows:

(1) A box made of three-ply veneer covered with vulcanized fiber, 32 inches by 19 inches by 13 inches over all. Handles to be of leather and all hinges, locks, and handles to be as flat as possible so as not to interfere with proper packing in wagons.

Any suitable equivalent, such as the Army trunk locker, a telescope, or leather trunk, conforming to the prescribed dimensions and weight and free from projecting parts, is authorized.

(2) A canvas roll, the bundle not to exceed 39 inches in length and 21 inches in diameter.

(3) Canvas bedding rolls for use in the field, as contemplated herein, made in accordance with the sealed pattern in the office of the Quartermaster General of the Army, will be kept on hand by the Quartermaster Corps for sale to officers. (Par. 318, War Department Compilation of General Orders, Circulars and Bulletins.)

4. Division of an officer's equipment. An officer's field equipment may be divided as follows:

- (1) What is carried on his person $\left\{ \begin{array}{l} (a) \text{ Clothing.} \\ (b) \text{ Arms and equipment.} \end{array} \right.$
- (2) What is transported $\left\{ \begin{array}{l} (a) \text{ In campaign or on the march.} \\ (b) \text{ For permanent camp.} \end{array} \right.$
- (3) Horse equipments. (Mounted officers only.)

¹ In case of captains and lieutenants, the tentage allowance of 1 shelter tent (mounted) is not included in these 50 pounds,—that is, the allowance is 50 pounds, *not* including the shelter tent, which, in the case of company officers, forms a part of and is carried with, the company baggage. (Page 10, Tables of Organization; and page 113, G. O. 39/15.)

DISMOUNTED OFFICERS

5. (1) Carried on person

(The authority requiring an article is given in every case. The articles suggested are so indicated. The Uniform Regulations are abbreviated, "U. R." The articles suggested are given as a sort of *aide-memoire*,—a kind of guide,—those to be taken along depending upon personal taste and other considerations.)

(a) Clothing.

- 1 Breeches, pr. (G. O. 39/15, pg. 544; U. R., pg. 51).
- 1 Drawers, pr. (G. O. 39/15, pg. 544; U. R. par. 50).
- 1 Gloves, Woolen O. D., pr. (When prescribed.) (U. R., pg. 51.)
- 1 Riding gloves for mounted officers (G. O. 39/15, pg. 540).
- 1 Hat, service, with cord (U. R., pg. 51).
- 1 Handkerchief (Suggested).
- 1 Leggings, pr., leather or canvas; woolen puttees (U. R., pg. 51).
- 1 Overcoat (If ordered). [U. R., par. 92 (a) (b)] (G. O. 39/15, pg. 544, winter use.)
- 1 Shirt, O. D. (U. R., pg. 51; G. O. 39/15, pg. 545).
- 1 Shoes, pr., tan marching (U. R., pg. 51; G. O. 39/15, pg. 545).
- 1 Stockings, pr. (G. O. 39/15, pg. 545; G. O. 26/12, woolen).
- 1 Undershirt (G. O. 39/15, pg. 545; U. R., par. 50).
- 1 Waist belt (When O. D. shirt is worn without coat, U. R., par. 113; G. O. 39/15, pg. 544).

NOTE. The field and staff officers may wear boots and spurs instead of leggings. [U. R., par. 60 (a).]

(b) Arms and Equipment

- 1 Canteen (U. R., pg. 51 and 66). When dismounted, to be worn fastened to belt on the right buttock; when mounted, to be fastened (with strap) to the off cantele ring. (U. R., par. 63.)
- 1 Canteen cover (U. R., pg. 51).
- 21 Cartridges, ball, pistol (U. R., pg. 52). 7 are carried in the magazine in the pistol and 7 in each of the two extra magazines.
- 1 Compass (U. R., pg. 51 and 66). For officers serving with troops and all others when their duties may require their use. Chaplains will not be required to provide themselves with the compass. Medical officers will not be required to provide themselves with compasses, but medical officers on duty with sanitary units in the field will carry a compass. (U. R., note, pg. 67.)
- 1 Cup (U. R., pg. 51). Carried on bottom of canteen in canteen cover.
- 1 Dispatch case (U. R., par. 71). For staff officers and those acting as such, whose duty may require them to use a dispatch case. They are obtainable from the Ordnance Department on memorandum receipt. (U. R., par. 71.)
- 6 Envelopes, field message (Suggested).
- 1 Fork (U. R., pgs. 51 and 66). When dismounted, to be carried in the haversack; when mounted, to be carried in the near-side saddle bag or off-side pommel pocket. (U. R., par. 38.)
- 1 Field glasses (U. R., pgs. 52 and 66). Chaplains will not be required to provide themselves with field glasses. (U. R., note, pg. 67.) Medical officers will not be required to provide themselves with field glasses, but medical officers on duty with sanitary units in the field will carry field glasses. (U. R., note, pg. 67.) Field glasses are carried when equipped for the field, and are worn on the right side, the strap passing over the left shoulder. An excellent field glass, Type EE, 6-power, price \$36.25, can be purchased from the Signal Corps. Application for purchase should be made to the Chief Signal Officer of the Army, Washington, D. C., and should be accompanied by Form No. 240, Signal Corps, properly accomplished, and postal money order payable

- to the Disbursing Officer, Signal Corps, U. S. Army. In the Philippines, application should be made to the Department Signal Officer.
- 1 First-aid packet and pouch (U. R., pgs. 52 and 66). Worn with the pistol belt, on the left hip, just back of the seam of the breeches. (U. R., par. 74.)
 - 1 Haversack and pack carrier (U. R., pgs. 51 and 66). When dismounted, the new model haversack is carried on the back and the old model is worn on the left side, the strap passing over the right shoulder; when mounted, saddlebags, or pommel pockets and ration bags are carried instead. (U. R., par. 78.)
 - 1 Identification tag (U. R., pgs. 51 and 66). When equipped for field duty the identification tag is worn under the shirt, suspended from a cord around the neck. (U. R., par. 79.)
 - 1 Knife, mess (U. R., pgs. 51 and 66). When dismounted, to be carried in the haversack; when mounted, to be carried in the near-side saddle bag or off-side pommel pocket. (U. R., par. 88.)
 - 1 Knife, pocket (Suggested).
 - 2 Magazines (U. R. pg. 53, authority inferred). Carried in magazine pocket.
 - 1 Magazine pocket, web, double (U. R., par. 74). When the pistol belt is worn with the field equipment, the magazine pocket, web, double, will be worn in front of the left hip. (U. R., par. 74.)
 - Matches (Suggested).
 - 1 Meat can (U. R., pgs. 51 and 66). When dismounted, to be carried in the haversack; when mounted, to be carried in the near-side saddle bag or off-side pommel pocket. (U. R., par. 88.)
 - Money (Suggested). (Under certain conditions, also check book, or a few blank checks.)
 - 1 Note book (U. R., pgs. 51 and 66). (Message pad suggested.) Pencils (U. R., pgs. 51 and 66). (1 lead with eraser on one end, and one indelible, suggested.)
 - 1 Pistol (U. R., pgs. 52 and 66). The pistol is worn when equipped for field service by veterinarians and all officers, except chaplains and officers of the Medical Department. However, whenever necessary for personal protection, medical officers may carry pistols. The pistol is worn on the right hip. (U. R., par. 95.)
 - 1 Pistol belt (U. R., pgs. 52 and 66). To be worn outside the coat or overcoat. (U. R., par. 95.) General officers, officers of the Staff Corps and Departments and Cavalry officers wear the officers' leather waist belt with magazine pocket and necessary leather slides for first-aid packet pouch, for the canteen, and for the pistol holster. Officers of Infantry, Field Artillery, Engineers, Coast Artillery, and Signal Corps, wear the web pistol belt, model of 1912. (U. R., note, pg. 66.)
 - 1 Pistol holster (U. R., pgs. 52 and 66).
 - 1 Spoon (U. R., pgs. 51 and 66). When dismounted, to be carried in the haversack; when mounted, to be carried in the near-side saddle bag or off-side pommel pocket. (U. R., par. 88.)
 - 1 Watch (U. R., pgs. 51 and 66). (Wrist watch is suggested as being by far the most satisfactory for field service. The "D-D" Khaki Watch, manufactured by Jacques Depollier & Son, 15 Maiden Lane, New York, and sold by leading watch jewelers, is recommended. It is probably the best wrist watch on the market today.)
 - 1 Whistle (U. R., pgs. 51 and 66). Carried by all company officers, battalion commanders and battalion adjutants when equipped for field service. There are three types of whistle, as follows: The "Siren" for the Battalion Group, consisting of major, battalion adjutant, and battalion sergeant major of Infantry and Cavalry; the "Kinglet" for the Company Commander Group, consisting of captain and two buglers; the "Thunderer" for the Platoon Leader Group, consisting of lieutenants and sergeants. (U. R., note, pg. 66, as amended.)

6. (2) To be transported

(NOTE. The division of articles indicated below between the bedding roll and the clothing roll is merely a suggestion.)

(a) In campaign or on the march

- 1 BEDDING ROLL, CANVAS (G. O. 39/15, pg. 544). Should be marked with name, and rank of owner. The bedding adopted by the Quartermaster Corps or any other canvas roll may be used as a combination bedding-clothing roll. The Quartermaster Corps bedding and clothing rolls may be purchased from the Depot Quartermaster, 26th St. and Grays Ferry Road, Philadelphia, Pa., at the prices specified in the Annual Price List of Clothing and Equipage. Bedding roll to contain the following articles:
 - 1 Bag barrack (Optional). (G. O. 39/15, pg. 544.)
 - 1 Basin, canvas (G. O. 39/15, pg. 544.)
 - 1 Blanket (U. R., pg. 66; G. O. 39/15, pg. 544.)
 - 1 Bed sack (Optional). (G. O. 39/15, pg. 544.)
 - 1 Bucket, canvas (G. O. 39/15, pg. 544). See page 175.
 - 1 Coat, O. D., service (If prescribed). (U. R., pg. 51.)
 - 1 Headnet, mosquito. (Only when specially ordered.) (G. O. 39/15, pg. 545.)
 - 1 Lantern, folding (or combination) (G. O. 39/15, pg. 545). Or (suggested) an acetylene lamp The Columbia Watchman's Lamp (Pinkerton Model), manufactured by the Hine-Watt Mfg. Co., 16 East Randolph St., Chicago, Ill., is recommended. Price, \$3.50; with dark lantern shutter, \$4.50. See page 175. If acetylene lamp is carried, a can or two of carbide must be taken along.
 - 1 Mosquito bar (G. O. 39/15, pg. 545).
 - 1 Night cap, woolen (Suggested). (For use in cold weather. See, "Sweater.")
 - 1 Pillow, with colored case (Suggested).
 - 10 Pins, shelter tent } (For officers below the rank of major only.) (G. O.
 - 2 Poles, shelter tent } 39/15, pg. 545.)
 - 1 Poncho (For dismounted officer). (G. O. 39/15, pg. 546.) (Rubber cape or coat is suggested instead.)
 - Rope (Suggested). (A piece of ¼-inch rope about 15 feet long, with ends tied to upright poles, about a foot below the ridge pole, is a great convenience for hanging clothes.)
 - 1 Shelter tent mounted pattern (For each officer below the grade of major, only). (G. O. 39/15, pg. 546.) Shelter tents may be drawn on memorandum receipt from the quartermaster. (Decision J. A. G., Bul. 15/17.) Shelter tents will be carried as baggage in addition to the 50 pounds allowed each officer. (Tables of Organization, 1914, page 10.)
 - 1 Shoes, pr., tan (G. O. 39/15, pg. 545.)
 - 1 Sleeping pad (light mattress) (Suggested). See page 175.
 - 1 Slicker (for each mounted officer) (G. O. 39/15, pg. 546).
 - 1 Slippers, pr., or preferably "Romeos." (Suggested.) (A great convenience and comfort in camp.)
 - Stationery (Suggested). [Blotter; envelopes, official and ordinary; fountain pen; bottle of ink, in wooden tube with screw top (Waterman's Ink recommended); scratch pad; paper; pencils; shipping tags; stamps or stamped envelopes.]
 - Sweater (suggested). In cold weather it is most important both for comfort and health that the extremities (hands, feet and head) be kept warm at night. A sweater with rolling collar, a pair of heavy woolen socks and a woolen knitted night cap, are excellent for this purpose, being equivalent to two or three blankets.
 - 1 CLOTHING ROLL (U. R., pg. 66; G. O. 39/15, pg. 545). See remark after, "Bedding roll." Should be marked with name and rank of owner. May be carried in bedding roll or separately. To contain the following articles:
 - 1 Breeches, pr. (G. O. 39/15, pg. 544.)
 - 1 Brush, hair (Suggested).
 - 1 Brush, shaving (Suggested).
 - 1 Brush, tooth (G. O. 39/15, pg. 546).
 - 6 Candles (Suggested). If candles are carried instead of folding lantern or acetylene lamp, then camp candle sticks should be carried. See page 175.
 - 1 Cards, playing, pack (Suggested, if desired).

6 (contd.)

- 1 Comb (G. O. 39/15, pg. 546).
- 1 Diary (Suggested). (Some officers make it a rule always to keep a diary while in the field. It is very convenient to refer to afterwards as to dates of various happenings.)
- 3 Drawers, prs. (G. O. 39/15, pg. 545; U. R., par. 50.)
- 1 Foot powder (G. O. 26/12).
- 4 Handkerchiefs (Suggested).
- 1 Housewife (Suggested). See page 175.
- 1 Laces, shoe, tan, pr. (G. O. 39/15, pg. 545). An extra pair is suggested.
- 1 Listerine, small bottle (Suggested).
- 6 Matches, boxes (Suggested).
- 1 Mirror (G. O. 39/15, pg. 546). (Metal mirror suggested.)
- 1 Note book (U. R., pg. 51).
- 2 Pajamas, prs. (Suggested).
- 3 Pencils (U. R., pg. 51).
- 1 Razor (Suggested).
- 1 Razor strop (Suggested).
- 6 Safety pins, large (Suggested). (In addition to those in housewife. Large safety pins are very useful in camp.)
- 1 Shaving stick (or powder) (Suggested).
- 1 Shirt, O. D. (G. O. 39/15, pg. 545).
- 1 Soap box (Suggested).



Fig. 1

OFFICER'S CLOTHING ROLL READY FOR TRANSPORTATION AS A HANDBAG OR IN THE BEDDING ROLL

- 1 Soap, cake (G. O. 39/15, pg. 546).
- 6 Stockings, prs. (U. R., par. 50; woolen, G. O. 26/12; G. O. 39/15, pg. 545).
- 1 Talcum powder (Suggested).
- 1 Tobacco (Suggested).
- 1 Toilet paper, 1 package (G. O. 39/15, pg. 546).
- 1 Tooth powder (or paste) (Suggested).
- 1 Towel, bath (Suggested).
- 3 Towels, face (G. O. 39/15, pg. 546).
- 3 Undershirts (G. O. 39/15, pg. 545; U. R., par. 50).
- 2 Wash rags (Suggested).

(b) For permanent camp (in addition to articles already listed)

- 1 Bath tub, rubber or canvas (Suggested). See page 175.
- 1 Blanket (G. O. 39/15, pg. 544).
- 1 Books, professional (Suggested).
- 1 Breeches, pr. (Suggested).
- 1 Chair (or more) (Suggested). (Mark with name and regiment. See page 175.)
- 1 Clothes hanger, which can be attached to tent pole. See page 175. (Suggested.)
- 1 Cot G. M. (G. O. 39/15, pg. 545).
- 3 Drawers, prs. (Suggested).

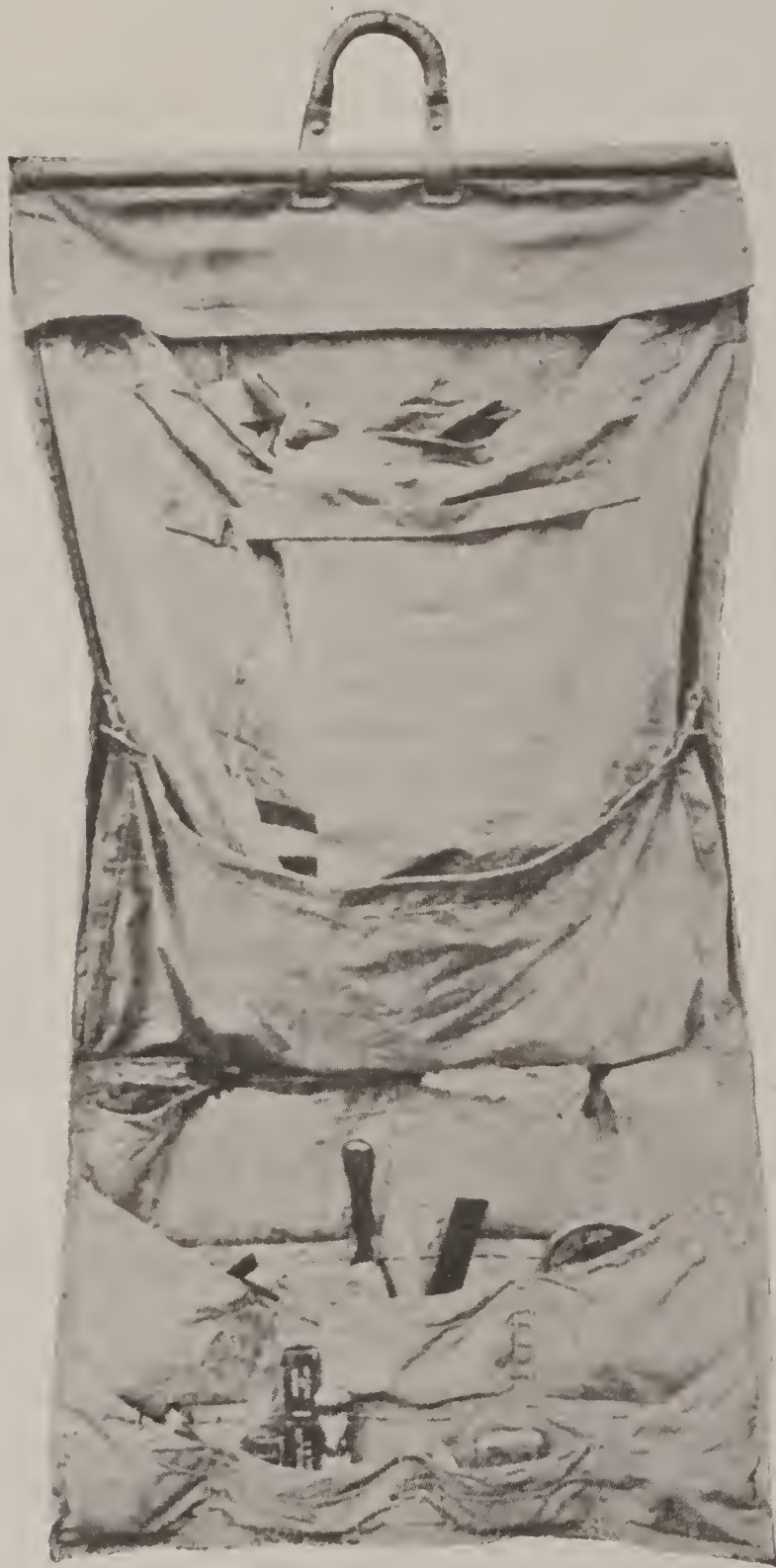


Fig. 2

OFFICER'S CLOTHING ROLL HUNG ON TENT POLE, AFFORDING READY ACCESS
TO ARTICLES IT CONTAINS

- 6 Handkerchiefs (Suggested).
- 1 Oil stove (Suggested). (For use in cold weather.)
- 1 Overcoat (if not worn) (Suggested).
- 1 Laces, shoe, extra pair (G. O. 39/15, pg. 546).
- 1 Leggings, pr. (Suggested).
- 1 Locker (G. O. 39/15, pg. 545). (Mark with name and rank.)
- 2 Sheets, bed (Suggested).
- 1 Shirt, O. D. (G. O. 39/15, pg. 546).
- 1 Stockings, pr. (G. O. 39/15, pg. 546).
- 1 Table, camp (Suggested). (Mark with name and rank. See page 175.)
- 2 Towels, bath (Suggested).
- 1 Undershirt (G. O. 39/15, pg. 546).
- 1 Whisk broom (Suggested).

(NOTE. Should the transportation be so limited as to prohibit the use of the bedding roll, a blanket or two, with the necessary clothing and toilet articles may be packed in the clothing roll, or other suitable piece of canvas, and the bedding roll with surplus articles left behind.)

MOUNTED OFFICERS

7. Arms. Same as for dismounted officers, except that chaplains are not required to have the pistol and ammunition.

Medical officers and dental surgeons will not be required to provide themselves with pistols and ammunition, but they may carry same when necessary for personal protection.

Personal equipment. Same as for dismounted officers, omitting haversack and pack carrier; also, poncho, substituting therefor slicker.

Chaplains will not be required to provide themselves with compass, field glass, and pistol belt.

Medical officers and dental surgeons will not be required to provide themselves with field glasses, compass, and pistol, but medical officers on duty with sanitary units in the field will carry field glass and compass. (U. R., pg. 67.)

8. Horse Equipments

(U. R., pgs. 51 and 68.)

<i>New Model Equipments</i>	—or—	<i>Old Model Equipments</i>
1 Bridle		1 Bridle
1 Cooling Strap		1 Bridle, watering (issued only with curb bridle M. 1902)
1 Carrier Strap		1 Currycomb
1 Currycomb		1 Feed bag
1 Feed bag		1 Grain bag
1 Grain bag		1 Halter, complete
1 Halter, stable		1 Horse brush
1 Horse brush		1 Horse cover (blanket lined when re- quired)
1 Horse cover (blanket lined when re- quired)		1 Lariat
1 Lariat		1 Lariat strap
16 Nails, horseshoe (to be carried on mount. G. O. 39/15)		1 Link
1 Picket pin		16 Nails, horseshoe (to be carried on mount. G. O. 39/15)
1 Picket pin carrier, special pair		1 Picket pin
1 Pommel pocket, officer's		1 Saddle (McLellan or Whitman)
1 Ration bags, pair		1 Saddlebags, pair
1 Saddle, officer's		

New Model Equipments—Continued

- 1 Saddle blanket
- 2 Saddlecloths, officer's (with insignia)
- 2 Shoes, horse (fitted and numbered; to be carried on mount) (G. O. 39/15)
- 1 Spurs, pair

Old Model Equipments—Continued

- 1 Saddle blanket
- 2 Saddlecloths, officer's (with insignia)
- 2 Shoes, horse (fitted and numbered; to be carried on mount) (G. O. 39/15)
- 1 Surcingle
- 1 Spurs, pair

- NOTE. 1. For articles that officers may draw from the ordnance for their official use, see A. R. 1522, and G. O. 24, W. D., 1914. Dispatch cases for those required to have them, are issued as indicated in U. R., par. 71, pg. 34.
2. Officers below the grade of major, required to be mounted, may be furnished with horse equipments by the Ordnance Department. (A. R. 1520.)

9. Field allowance of tentage. Each field officer is allowed 1 small pyramidal tent, and each captain, and each lieutenant, 1 shelter tent, (mounted, complete). In the case of company officers the shelter tents are carried with the company baggage, G. O. 39/15, allowing 3 to each company.

10. Insignia on collar of shirt. When the olive drab shirt is worn without the coat, insignia will be worn on the collar as follows:

(1) REGULAR SERVICE

Colonel.—On the right side, in the middle of the collar, the letters "U. S." and an eagle, beak to the front; the letters "U. S." to be one inch from end of collar. On the left side, in the middle of the collar, and one inch from the end, the insignia of corps, department, or arm of service.

Lieutenant colonel.—On the right side, in the middle of the collar, the one inch from the end of the collar. On the left side, in the middle of the collar, and one inch from the end, the insignia of corps, department, or arm of service.

Major.—Same as lieutenant colonel (substituting "a gold oak leaf").

Captain.—Same as lieutenant colonel (substituting "two bars, one-fourth inch apart and parallel to the end of the collar").

First lieutenant.—Same as lieutenant colonel (substituting "one bar parallel to the end of the collar").

Second lieutenant.—On the right side, in the middle of the collar, and one inch from the end, the letters "U. S." On the left side, in the middle of the collar, and one inch from the end, the insignia of corps, department, or arm of service.

(2) NATIONAL GUARD SERVICE

Same as for officers of the regular service, except that the letters—not to exceed four—forming the abbreviation of the name of the State, Territory, or District of Columbia will be substituted for the letters "U. S." and a silver oak leaf, point up; the letters "U. S." to be "U. S."

(3) VOLUNTEERS OR OFFICERS' RESERVE CORPS

Same as for officers of the regular service, except that the letters "U. S. R." will be substituted for the letters "U. S."

10½. Personal baggage authorized for European service. Until further orders officers designated for duty with the expeditionary forces in Europe may take with them to the Port of Debarkation the following personal baggage:

(a) *Officers above grade of captain:* The field allowance given in paragraph 1136,¹ Army Regulations. This allowance shall include equipment "C" (par. 20), professional books and all necessary clothing and bedding for extended field service.

(b) *Officers below grade of major, contract surgeons, acting dental surgeons, and veterinarians:* Three hundred and fifty pounds. This allowance shall include equipment "C" (exclusive of horse equipment), professional books, and all necessary clothing and bedding for extended field service.

(c) The standard trunk lockers and bedding rolls or their equivalent in similar containers, are authorized as containers for personal baggage. (Instructions, A. G. O., June 25, 1917.)

(d) *Forwarding and marking baggage.* G. O. No. 75, War Dept., June 23, 1917, states: An officer ordered for duty in Europe will not disclose to any unauthorized person the name of the ship upon which he is to sail or the date of sailing. All personal baggage forwarded to a point of embarkation for oversea shipment will be addressed in care of the quartermaster at that port and information furnished the quartermaster of the disposition to be made of it. In marking the baggage there must be nothing to indicate the name of the vessel upon which it is to be shipped or the date of sailing.

¹ These allowances are: Field officer, 400 lbs.; brigadier general, 700 lbs.; major general, 1000 lbs.; lieutenant general, 1500 lbs.

CHAPTER II

EQUIPMENT AND PERSONAL EFFECTS OF ENLISTED MEN

11. Worn on person. The articles of clothing worn, and the articles of equipment carried by enlisted men, are given in the Uniform Regulations, G. O. 39/15, and the Unit Equipment Accountability Manuals of the various arms.

12. Field kit. The "field kit," clothing component, for all arms and branches of the service, in addition to the clothing worn on the person is composed of the following-named articles:

1 blanket	2 stockings, prs.
1 comb	1 tooth brush
1 drawers, pr.	1 towel
1 poncho (dismounted men)	1 undershirt
1 slicker (mounted men)	1 housewife (for one man of each
1 soap, cake	squad)

The field kit is carried on the person.

13. Surplus kit. The field kit is supplemented by the "surplus kit," which is composed of the following-named articles:

1 breeches, pr.	2 stockings, prs.
1 drawers, pr.	1 shoe laces, extra pair
1 shirt, olive drab	1 undershirt
1 shoes, russet leather, pr.	

The surplus kit pertains to equipment "B" (see Chapter III), as part of the permanent camp equipment, to be forwarded to troops when serving in instruction, maneuver, mobilization, or concentration camps, or when in active service a temporary suspension of operations permits the troops to refit. In peace-time maneuvers and marches the surplus kit may accompany the troops, if so directed in the orders prescribing the movement.

14. Service kit. The field kit and the surplus kit make up the clothing component of the "service kit."

15. Surplus kit bags. Surplus kit bags are issued to each organization at the rate of one to each squad, one for the sergeants and one

15 (contd.)

for the cooks, and buglers, and one for every eight men of detachments.

Each bag is marked with the letter of the company and the number of the regiment, as provided in paragraph 295, Army Regulations, for haversacks, and the proper designation of the squads to which the bags belong, both markings being in center of front cover flap, as shown in the following illustration:

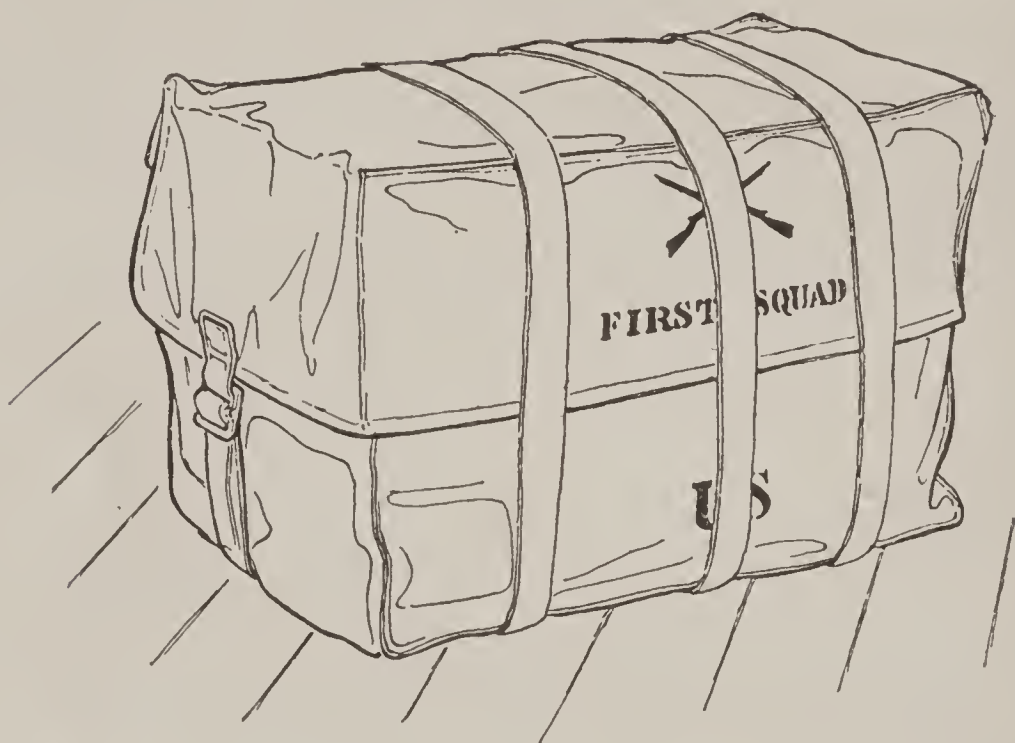


Fig. 3

The kit bag for the sergeants and that for the cooks and buglers is marked "Sergeants," "Cooks and Buglers," respectively. Similarly, the kit bags for detachments are appropriately marked.

The kit of each man is packed as follows:

Stockings to be rolled tightly, one pair in the toe of each shoe; shoes placed together, heels at opposite ends, soles outward, wrapped tightly in underwear, and bundle securely tied around the middle by the extra pair of the shoe laces, each bundle to be tagged with the company number of the owner. These individual kits are packed in the surplus kit bag in two layers of four kits each, the breeches and olive-drab shirts to be neatly folded and packed on the top and sides of the layers, the jointed cleaning rod and case, provided for each squad, being attached by the thongs on the inside of the bag.

In garrison, the surplus kit articles are not required to be kept habitually packed and stored, or kept apart from the rest of a soldier's belongings. The soldier should have the clothing component of the service kit. Surplus kits are packed only when commanders require it to be done.

Organization commanders are required to keep on hand a sufficient supply of surplus kit bags, marked as prescribed above, but unpacked.

16.

Service Uniform

(From page 62, Uniform Regulations)

Occasions	All enlisted men	Articles
For field duty.	When dismounted.	<div>A</div> <div><div>1. Service hat, with hat cord sewed on (peaked, 4 indentations).</div><div>2. Olive-drab shirt.</div><div>3. Service coat.</div><div>4. Service breeches.</div><div>5. Marching shoes.</div><div>6. Leggings.</div><div>7. Identification tag.</div><div>8. Brassards, by those entitled to wear them.</div><div>9. Ribbons by those entitled thereto. (Ribbons will not be worn on the olive-drab shirt.)</div><div>10. Olive-drab woolen gloves, when prescribed (optional when not on duty).</div><div>11. Field belt.</div></div>
	When mounted.	<div>B</div> <div><div>Same as A, omitting "10, Olive-drab woolen gloves," and adding:</div><div>1. Regulation riding gloves, when prescribed.</div><div>2. Spurs.</div></div>

NOTES

1. With dismounted service uniform, in the field, noncommissioned staff officers will carry the pistol instead of the saber. (Page 62, Note 6, Uniform Regulations.)
2. Distinctive marks awarded for excellence in marksmanship, the aviator's badge, and the swordsman's badge will not be worn in the field. (Par. 58-e, Uniform Regulations.)
3. When the olive-drab shirt is worn without the coat, except when the coat is only temporarily removed, the chevrons will be worn on the sleeves of the shirt by noncommissioned officers, and the button insignia will be worn on the collar by all enlisted men, in the manner prescribed for the service coat. (Par. 82, Uniform Regulations.)

16½. Personal baggage authorized for European service. Until further orders troops designated for duty with the expeditionary

forces in Europe may take with them to the Port of Debarkation the following personal baggage:

(a) *Noncommissioned officers of and above the grade of color sergeant and civilian employees of the classified service:* Such clothing and personal effects as can be contained in one trunk locker or other container of equivalent capacity and not exceeding one hundred and fifty pounds in weight. This allowance shall be in addition to equipment "C," and shall include, with equipment "C," all necessary clothing and bedding for extended field service.

(b) *Enlisted men below grade of color sergeant and civilian employees not in the classified service:* Such clothing and personal effects as can be contained in one barrack bag or its equivalent, and not exceeding seventy-five pounds in weight. This allowance shall be in addition to equipment "C," and shall include, with equipment "C," all necessary clothing and bedding for extended field service. (Instructions, A. G. O., June 25, 1917.)

CHAPTER III

FIELD TRAINING—FIELD EFFICIENCY—FIELD EQUIPMENT

17. Field training defined. Field training embraces especially: Range practice; field firing exercises with service ammunition; field fortifications, including the reconnaissance and selection of positions, and the actual construction of appropriate intrenchments; the service of security and information (Field Service Regulations); marches and convoys; maintenance of communication between the elements of a command by signals and by messenger; the care of men and animals, including the preparation and service of food, shelter, and the service of sanitation and supply; the passage of obstacles; night operations; map making in accordance with the needs of the arm of service concerned; swimming of horses and men, to include swimming with arms and equipment under proper precautions as to safety; packing and exercises in the solution of transportation problems; the drafting of orders and messages as incidents of the above exercises; combat and field exercises, first of a simple nature but gradually becoming more and more comprehensive, passing to the larger units and involving combined operations and operations with the Organized Militia. (Par. 5, G. O. 17/13.)

18. Field efficiency. The excellence of an organization is judged by its field efficiency. The field efficiency of an organization depends primarily upon its effectiveness as a whole. Thoroughness and uniformity in the training of the units of an organization are indispensable to the efficiency of the whole; it is by such means alone that the requisite teamwork may be developed. (Par. 2, Infantry Drill Regulations.)

19. Field service defined. Field service is defined to be service in mobilization, concentration, or maneuver camps, as well as service in campaign, in simulated campaign, or on the march. (Par. 319, Compilation, War Department Orders.)

20. Classification of field equipment. The complete equipment for field service (equipment "C") consists of engineer, ordnance, signal,

medical, and quartermaster property, and is divided into two classes, "A" and "B."

Equipment "A." Equipment "A" is the equipment prescribed for use in campaign, in simulated campaign, or on the march. It is limited to the animals and vehicles prescribed in the Tables of Organization, the equipment and clothing worn on the person, and the articles carried on mount, and transported in field, combat, and divisional trains. (Par. 319, Compilation, War Department Orders.)

Equipment "B." Equipment "B" is the equipment which, in addition to equipment "A," is prescribed for the use of troops in mobilization, concentration, instruction, or maneuver camps and during such pauses in operations against an enemy as permit the better care of troops. (Par. 319, Compilation, War Department Orders.)

Equipment "C." Equipment "C" is the sum of equipment "A" and "B," and therefore includes every article prescribed for field service, as defined above. (Par. 319, Compilation, War Department Orders.)

21. Articles constituting equipments "A," "B," and "C." The articles of engineer, ordnance, and signal property listed in the several Unit Accountability Equipment Manuals belong to equipment "A."

The articles of medical property belonging to equipment "A" are shown in the Manual for the Medical Department.

The articles of quartermaster property belonging to equipment "A," "B," and "C," respectively, are shown in Equipment Tables, Quartermaster Supplies, published in G. O. 39/15. (Par. 319, Compilation, War Department Orders.)

22. Orders for field service to designate equipment to be taken. When troops are ordered on field service, instructions will state the letter designation of the equipment to be taken. The instructions will also specify whether mosquito bars and head nets are to form a part of the equipment, and what winter articles, if any, are to be included. The same rule will apply in the issuance of subsequent orders when necessary. Articles distinctively for winter use can be transported as baggage on the march only when transportation in addition to that prescribed in equipment "A" is provided for that purpose. In addition to the allowances prescribed as the field equipments, service coats, cravats, fatigue clothing, and other articles of uniform, extra bedding, and toilet articles may be taken by officers and enlisted men with equipment "B," when authorized in orders directing the movement of troops. (Par. 319, Compilation, War Department Orders.)

CHAPTER IV

A COMPANY TAKING THE FIELD

Under ordinary circumstances, a company commander receiving orders to take the field with only his company, should at once make the following preparations regarding rations, forage, transportation, equipage, blanks in field desk, etc.:¹

23. Rations. After you know how many days' rations are to be taken, consult the first sergeant and the mess sergeant as to what articles of the ration should be taken. If there is sufficient transportation, soft bread should, as a rule, be taken for the first two days.

The rations should be drawn and taken to the company as soon as practicable, so as to be on hand and properly packed in ample time to be loaded when the transportation reports. The mess sergeant should be charged with looking after the rations.

If fresh meat and fresh bread, or any other components of the ration, are to be shipped to you from your permanent station after your departure, arrange in person with the quartermaster all details connected with the matter.

If, before returning, rations are to be drawn from some other quartermaster, do not fail to get before you leave your ration certificate (Form No. 42, Q. M. C.) from the quartermaster from whom you last drew rations.

24. Forage. The forage ration consists of:

Horse

Mule

14 lbs. hay

14 lbs. hay

12 lbs. oats, corn, or barley

9 lbs. oats, corn, or barley

However, it is possible to cut down this amount, especially when the grazing is good. As a rule, teamsters are prone to carrying too much forage. The amount of forage to be taken will depend upon the

¹The order directing a company to take the field should make provision for medical attendance and supplies, and state the kind of equipment to be taken, the number of rations, the amount and kind of tentage, the time of departure, the probably duration of absence and the nature of the duty to be performed. If the order does not give this information, the company commander should obtain it by inquiry from proper authority.

facilities for getting forage after you leave, the amount of transportation available for carrying forage, and other considerations.

25. Transportation. Arrange with the quartermaster about the details of your transportation.

If you are to have only wagon transportation, have it report to you in advance for your careful personal inspection of wagon, harness, and animals.

If rail or water transportation is to be furnished, obtain the necessary transportation request from the quartermaster.

If the command is supplied with cooked or travel rations, and it is impracticable to cook coffee en route, the company commander may get funds from the quartermaster for the purchase of liquid coffee, at the rate of 21 cents a day for each man for the actual number of days traveled, the money being accounted for on Form No. 372, W. D., the vouchers thereto being Form No. 19, Q. M. C.

If rail transportation is furnished, the cars must be inspected before the troops embark, and also after they disembark, and their condition noted.

26. Kitchen cars. In movements by rail of a command consisting of 30 or more men, when special train service is provided, and the time required for the journey will exceed 48 hours, the Quartermaster Corps, when practicable, furnishes kitchen tourist cars at the rate of one for each 200 men or fraction thereof, and also arranges for a sufficient number of tables. This kitchen car is in charge of a mess officer designated by the commanding officer. (G. O. 218, '09; also, G. O. 34, '10.)

27. An expedient way of making coffee on train. In case troops traveling by rail are not provided with a kitchen car, piping hot coffee of an excellent quality may be furnished the command in this manner: Let the quartermaster take along the proper amount of ground coffee; put about two inches of the coffee into an ordinary G. I. bucket or camp kettle; add sugar, and then pour in enough cold water to dampen the mixture. It is not at all necessary, but the coffee may be in a loose sack; or, a piece of cheese cloth may be tied loosely over the top of the kettle. When the train stops about meal time, at a water tank or station, a detail of soldiers, assembled on a forward platform, rush out to the locomotive and, from the injector exhaust in the cab, or from the boiler exhaust-hole below, steam is turned into the kettles.

28. Tentage. As soon as you get the order directing your company to take the field, if pyramidal tents are to be taken, have them pitched without delay for inspection.

29. Quartermaster. If necessary, detail one of the lieutenants to act as quartermaster.

If wood and forage are to be purchased, camp sites to be rented, and other expenses incurred, the necessary arrangements must be made as to funds and blanks.

All vouchers for rent of camping ground must show the time the ground was occupied (for example, from July 1 to July 4, incl., 1917).

The blank forms that an acting quartermaster should carry into the field will depend, amongst other things, on the duration and nature of the service.

In the case of an ordinary practice march, where provisions are carried with the command or are shipped from the post, and when arrangement has been made with the post quartermaster for the payment of vouchers covering supplies purchased and services procured on the march, the following blank forms will usually suffice:

Q. M. C.

Form.

No.

101. Lease. (To be used when necessary to rent a camp site more than 24 hours.)

153. Original bill of lading.

154. Memorandum copy of bill of lading.

156. Shipping order.

169. Letter of transmittal of memorandum bill of lading and copies of transportation requests issued during day. (To the Depot Quartermaster, Washington, D. C.)

406. Official Telegram.

Transportation requests. (Form not numbered.)

W. D.

Form.

No.

330. Public voucher. Purchases and services.

If the acting field quartermaster himself is to disburse funds for supplies purchased and services procured on the march, and he will not return to the post in time to prepare and render his account current

on or before the 10th of the following month, then in addition to the blank forms enumerated above, he should carry:

Q. M. C.

Form.

No.

151. Report of bills of lading and transportation requests issued.

W. D.

Form.

No.

320. Account current.

329. Abstract of disbursements.

Check Book. (Treasury Department Form.)

Experience has shown that in the case of the ordinary practice march, it is always better to have the post quartermaster requisition in advance for the purchase of supplies and procurement of services that will probably be needed on the march, all vouchers, after accomplishment, being sent to the post quartermaster for payment.

30. Field desk. Have the company clerk pack the field desk, which would ordinarily contain about the following:

Army Regulations.

Field Service Regulations.

Drill Regulations.

Manual for Courts-Martial.

Manual of Interior Guard Duty.

Morning Report.

Daily Sick Report.

Duty Roster.

Service Records (with latest clothing order).

Memorandum book for data for muster and pay rolls.

Compilation of War Department General Orders, Circulars, and Bulletins.

Current file and last year's file of War Department general orders and bulletins.

Muster rolls.

Pay rolls.

Inventory of effects of deceased soldiers.

Special descriptive list of deserters.

Company return.

Company fund book.

Return of casualties in action (to be taken only in time of war).

- Field return.
- Furloughs.
- Discharges.
- Final statements.
- Ration returns.
- Official telegraph blanks.
- Survey reports.
- Statement of charges.
- Charge sheets.
- Stationery. (Envelopes, paper, rubber erasers, ink eraser, pins and paper fasteners, ink, pen points, pen holders, blotting paper, ruler, pads.)
- Correspondence book.
- Document file.

NOTE: Together with the field desk should be taken a light, compact typewriter, which now-a-days is really indispensable for the preparation of pay rolls, muster rolls, returns, reports, and other papers, all of which must be made out either in duplicate or triplicate, if not in quadruplicate. The CORONA is recommended as the best machine the author knows of for all-around garrison and field use. It is what might be called essentially a "military typewriter," being light, compact, and simple of construction, and being able to stand more knocking about than any other machine.

31. Field return. Before leaving, submit the Field Return (Form No. 26, A. G. O.), in compliance with A. R. 812, and the notes on the form.

NOTE. The only periodical reports or returns made by an officer in command of a detachment on detached service, are the muster rolls (Feb. 28, Apr. 31, June 30, Aug. 31, Oct. 31 and Dec. 31) and the pay rolls (monthly). No other reports or returns are rendered unless required by special instructions.

32. Company fund. Take along in cash as much of the company fund as may be considered necessary. Also, take along the company fund check book.

33. Medicines. If no surgeon or other medical attendants are to accompany the command, the following medicines should be obtained from the surgeon and taken along, the directions being plainly marked on each package:

<i>Medicines</i>	<i>Doses</i>	<i>Use</i>
Magnesium sulphate	1 oz.	Brisk cathartic
C o m p o u n d cathartic pills	1 to 3 pills	Cathartic
Castor oil	1/2 to 1 oz.	Bland cathartic; used in
Camphor and opium pills	1 to 2 pills	diarrhea, etc.
		For diarrhea and dys-
		entery

33 (contd.)

Squibb's Mixture	30 to 90 drops	Intestinal colic and diarrhea
Bismuth powders	10 to 30 grains	Indigestion and diarrhea
Aromatic spirits of ammonia.	30 to 60 drops	Stimulant to the heart; used in heat exhaustion
Whiskey	$\frac{1}{2}$ to 1 oz.	Stimulant
Potassium chlorate	Saturated solution (All that water will dissolve)	As a gargle for sore throats
Tincture of iodine	Paint over surface	For inflammations, contusions, bruises, etc., where the skin is not broken
Brown Mixture	1 to 2 teaspoonfuls	Bronchitis
Quinine sulphate tablets (3 grains)	1 to 4 tablets	For colds, malarial fever tonics, etc.
Copaiba pills	1 to 3 pills	Gonorrhea and other inflammations of the urinary tract, also sub-acute and chronic-bronchitis
Carbolized vaseline	Emollient	Dressings in sores and skin affections
Ammonia or soap liniment	External use	Sprains, bruises, etc.
Morphine sulphate	$\frac{1}{8}$ to $\frac{1}{4}$ grains	To relieve pain
Potassium bromide	10 to 15 grains	To quiet the system and produce sleep
Pepsin	10 to 30 grains	Indigestion
Mustard plaster	External use	Counter-irritant
Powdered ipecac	30 grains	To produce vomiting in case of poisoning
Mint tablets	1 to 2 tablets	Sour stomach
Sodium salicylate	1 to 3 tablets	Rheumatism
Phenacetin	3 to 5 grains	For headache and fevers. Combined with salol for influenza

Dressings: Sublimated gauze, bandages, first-aid packets, absorbent and safety, splints, iodoform, adhesive plaster and pins (common), cotton, cotton batting.

34. Map. Take along a map of the country to be traversed.

35. Sick and prisoners. Make arrangements about leaving behind the sick and, if necessary, prisoners. In the cavalry and field artillery provision must also be made for the horses, if any, to be left behind.

Sometimes men to be transferred to the Regular Army Reserve or discharged while troops are in the field, are left at the post.

The service records of all men remaining at the post, including the sick, must be left with the proper officers.

36. Mess outfit. In active campaign, company officers generally mess with their companies, having their meals served in their tents or other suitable place. They usually arrange with the mess sergeant to have extras prepared for them.

If on the march or in campaign, especially if without wagon transportation, the mess equipment would consist of the meat can, canteen and knife, fork and spoon. However, as a rule, the company officers mess together, using a mess outfit, consisting of table, camp chairs, plates, saucers, etc. See, "Officers' Mess Chest," par. 38.

37. Care of property left behind. A reliable noncommissioned officer and one or two reliable privates should be left behind to look after the barracks and the property not taken along. A company order should be issued making one of them responsible for all the property, and arrangements should be made about their mess during the absence of the company. As many articles of personal property as possible that are to be left behind are packed in the lockers, everything surplus being plainly marked with the owner's name and then packed in clothing boxes.

Mattresses, pillows, sheets, pillowcases, lamps, etc., should be turned in to the quartermaster or left stored in the company quarters depending upon the probable length of field service. All surplus ordnance should be carefully packed and locked or sealed.

The company quarters and premises should be policed, the windows fastened, the doors locked, and the keys turned over to the person to be in charge of the quarters.

38.

Officers' Mess Chest

(Chest to be plainly marked with name, rank and regiment of owner)
All measurements given are interior.



(Depth of tray, not including thickness of bottom, $3\frac{7}{8}$ ins.)



(Made of white pine, $\frac{3}{4}$ inch thick. Partitions $\frac{3}{8}$ inch thick. Corners reinforced—handles at ends—Yale padlock and key—exterior painted gray.)

CONTENTS

(Agate Ware.)

2 Baking pans (two sizes, so that one will fit into the other.)

1 Can opener.

6 Cans, with screw tops (cans in which Lowney's commissary candy comes).

1 Corkscrew.

1 Coffee pot (small).

6 Cups, with handles (3 ins. deep; $3\frac{3}{8}$ ins. diam.

6 Cups, without handles (conical shape, $3\frac{3}{8}$ ins. high; $2\frac{7}{8}$ ins. diam. at top).

8 Forks, table.

1 Fork, iron, long.

1 Frying Pan.

1 Gridiron, wire.

1 Knife, meat.

(Continued following page.)

CONTENTS
(Agate Ware—Continued.)

- 8 Knives, table.
- 1 Meat cleaver.
- 1 Pepper box.
- 1 Pitcher, small.
- 6 Plates ($8\frac{5}{8}$ ins. diam.)
- 6 Plates (7 ins. diam.)
- 1 Platter (14 x 11 ins.)
- 1 Platter (12 x $8\frac{1}{2}$ ins.)
- 6 Ramekin dishes ($5\frac{1}{2}$ ins. diam.; 1 in. deep).
- 1 Saltseller.
- 6 Soup bowls ($5\frac{3}{4}$ ins. diam.; $2\frac{1}{2}$ ins. deep).
- 1 Soup ladle.
- 1 Spoon, iron, long.
- 10 Spoons, large.
- 8 Spoons, small.
- 3 Vegetable dishes (three sizes so that they will fit into one another).

NOTE. A camp kettle, a mess pan or two, a table cloth and a dozen napkins should also be taken along.

CHAPTER V

LOADING WAGONS

39. The property to be loaded should be carefully inspected before any is loaded, to see that everything is in good order and properly boxed, crated, or tied.

Large, heavy boxes should be avoided.

The following general rules must be observed.

1. Heavy stuff must go on the bottom (and forward rather than rear and light stuff on top—thus, heavy articles will not crush light ones and the center of gravity will be nearer the axles, making the turning over of the load more difficult.

2. Things needed first upon reaching camp must be placed on top or in rear.

The following method of loading a wagon is in accordance with the general principles cited above:

Ammunition. Ordinarily just back of the forward axle. In case of possible need, however, the ammunition should be placed where it could be gotten at immediately.

Axes, Spades, Shovels, and (Unhandled) Picks. Should be outside of wagonbed, in leather pockets or strong bags, or stood on end at rear of wagon. They should not be placed between the sides of the wagon and the load.

Blanket Rolls. If to be carried on wagon, they should be rolled tightly and left straight—not tied in a circle—and loaded on top, crosswise.

Camp Kettles and Buckets. Under the wagon, suspended from the reach pole.

Field Desk. To be placed on or near bottom and well forward, as it is seldom required early.

Field Range. On bottom, at rear of wagon. (The Infantry Equipment Board recommended that the field range be carried on tail gate of the wagon, lowered to a position of about 30 degrees from the horizontal.)

Forage. If to be carried on wagon, in front of ammunition.

Lashing. Use two pieces of $\frac{3}{4}$ -inch rope about 75 feet long, passing over load first from front to rear diagonally, and finally secured by being tied to rings on the rear bolster standards—never to the end gate rods. The rope should be passed through strong hooks securely clinched to the body of the wagon, and not passed around the ends of the bows.

Officers' Bedding Rolls. To be on top of load.

Rations. Surplus rations (not required for next camp) in bottom of wagon, between ammunition and ration box.

Bacon should be on the bottom of wagon, where the grease will do no harm.

Ration Box. Next to field range, toward front of wagon. After the field range has been unloaded, the ration box is readily accessible and need not be unloaded.

At every camp the ration box should be restocked for the next camp.

Sibley Stoves. Slung on chain, just outside of feed box.

Stove Pipe. Should be crated and lashed on in rear of a wagon.

Tentage. Should be placed on top of boxes, etc.

(Attention is invited to the fact that canvas becomes unserviceable more from handling and transportation than from wear when in actual use in sheltering troops).

Tent Pins. On top, in sacks.

Tent Poles. Should be tied with a rope and placed just inside the bows so as to extend above the wagon bed side; or carried in two iron hooks suspended from side of wagon bed, about four feet apart.

NOTES

1. **Pots and Kettles.** Should be in gunny sacks so as not to dirty everything.

2. **The Mess Sergeant** should be with the wagon.

3. **A Noncommissioned Officer** should personally superintend the loading of wagon.

4. **The Jockey Box** should be left entirely for use of teamster, and in which should be kept wrench, grease, spare bolts, mule shoes, etc.

5. A detail of men should accompany the wagon. Men who know how to meet emergencies, such as a wagon tipping over on a hillside, wagons requiring repacking, mule down and hurt, etc., should be selected.

CHAPTER VI

TRANSPORTATION AND CARING FOR MEANS OF
TRANSPORTATION

40. Different kinds of transportation. The usual means of transportation used for military purposes are:

- Wagons
- Auto trucks
- Pack animals
- Rail transportation
- Water transportation.

41. Wagon transportation. According to the Tables of Organization, the following wagon transportation is allowed to each battalion of Infantry (4 companies):

- 1 wagon for baggage (carries small pyramidal tent for battalion commander; officers' bedding rolls; messing and cooking equipment for 4 companies; 1 field desk for each company).

- 2 wagons for rations (carry 2 days' field rations and 1 day's reserve ration for the battalion, and grain ration for 2 days).

- 1 combat wagon (carries the ammunition, 120 rounds per man; also, 7 litters, 16 axes, 16 picks and 16 shovels).

42. Auto trucks. The allowance of auto trucks has not yet (July, 1917) been published. The average load for the type of truck used by the Army in combat and other trains, is about 3000 pounds.

43. Pack animals. The average, normal load for a pack mule is 250 pounds. For short distances, under most favorable conditions, this can be increased to 400 pounds.

There are 50 pack and 14 riding mules in a pack train. There is no fixed allowance of pack transportation. However, under normal conditions, where no other transportation is furnished, one pack train would probably be assigned to each battalion.

44. Water transportation. The general subject of water transportation is covered in the U. S. Army Transport Regulations, while convoys by water are covered in the Field Service Regulations.

RAIL TRANSPORTATION

45. Preparation of cars. Upon receipt of orders for the movement of troops by rail, the quartermaster charged with supplying the transportation arranges with the railroad authorities for the necessary cars. He procures lists, with weights, of all property to be shipped and makes out the bills of lading. He provides loading facilities and material for blocking and lashing, and constructs the necessary ramps.

Upon arrival of the cars, the quartermaster inspects to see if they conform to the terms of the contract, and reports the result of his inspection to the commander.

Stock cars are inspected with especial care to see that they are all in good order throughout. Projecting nails, bolts, and splinters, loose boards and rotting flooring, broken fixtures on hayracks, doors, or troughs, all are sources of danger or discomfort to the animals and of loss to the Government. The cars should be clean before loading, and suitable bedding provided.

Passenger cars must be clean, fully supplied with water and ice, and sufficiently lighted and heated. The urinals and closets must be in good condition, well supplied with toilet paper and water, and the sleeping accommodations according to contract.

Each train should be equipped with water buckets, lanterns, axes, and crowbars.

After the cars have been accepted, the number of men allotted to each is marked on the side or steps. The cars are then assigned to organizations and plainly marked.

46. Loading and entraining. At the proper time loading is begun and carried on, usually by the troops, pursuant to the orders of the commander. Heavy property may be loaded by details before the arrival of the troops.

The following order is generally observed in loading:

1. Company property, etc., not used in transit (in box cars locked and sealed by railroad employees prior to departure of train):
 - Company property.
 - Property of officers and men.
 - Ammunition.
 - Rations.
 - Sanitary stores.
 - Tentage.
 - Cooking utensils.
 - Arms and equipment of men when not carried in coaches or baggage car.
2. Transportation (on flat cars):
 - Guns and artillery carriages.
 - Pontons.
 - Wagons, etc.
 - Ambulances.
3. Forage (in box cars).

4. Checkable baggage, rations for use en route and arms (in baggage and kitchen cars under guard).
5. Animals (in stock cars).
6. Men (in coaches or sleepers).

Artillery and other carriages are made secure by lashings and by nailing blocks of wood to the flooring under the wheels.

The arrival of troops at the station should be timed so that there will be no delay in waiting for cars. When the barrack, camp, or bivouac is not more than a mile from the station, troops are not required to fall in until notice has been received from the quartermaster that the cars are at the station and have been inspected and assigned. The command is then marched to the train and the property loaded. The organizations are then marched opposite their cars and entrained. The cars are entered simultaneously, each company commander distributing his men according to the assignment. Noncommissioned officers have seats near the doors.

Troops traveling by train seldom require their arms or all of their equipment. For instance, when sleepers are provided, they generally require no equipment other than their canteens and haversacks, the mess kits and necessary toilet articles being carried in the latter. For mounted troops the saddlebags take the place of haversacks. A few revolvers or rifles suffice for the necessary guard duty. Therefore, to add to the comfort of the men, train commanders may cause the arms and equipments not required en route to be properly secured and stored in a property or baggage car.

Mounted troops dismount upon arrival and remove the horse equipments except the halter. Each man's equipment, except halter, canteen, and saddlebags, is then securely tied in a gunny sack (or other receptacle supplied by the Quartermaster's Department), marked with the number of the man and letter of his troop, and loaded in the proper car. Each troop, except the horse holders, is then marched to its cars where the men deposit their arms (if not otherwise disposed of), canteens, and saddlebags. It then marches back, relieves the horse holders, and loads the horses. The horse holders, unless otherwise ordered, repair to their cars, carrying their arms (if left with them), canteens, and saddlebags. For short journeys the horses may be loaded, saddled (stirrups crossed) and bridled, or the bridles may be tied on the saddles.

In the field artillery a similar method is pursued. The harness is usually tied up in sets, plainly marked, and loaded in a box car.

Animals can be conveniently loaded through chutes of stock yards, or from freight platforms level with the car floors. In other

cases portable or improvised ramps will have to be used. When it is likely that the animals will have to be unloaded at places without facilities, one or more portable ramps, or material for improvising them, should be carried on the train. The loading should proceed without noise or confusion, the animals being led quietly to the car door and turned over to the four men, two for each end, who do the loading. The animals should be packed as closely as possible, except in very hot weather. Halters are not removed. Gentle animals should be placed opposite the doors and are therefore loaded last.

The *time* required for loading each train depends upon the railroad facilities and upon the experience of the troops. For troops leaving station to go into the field, or changing station in the field, the time required should not exceed:

One hour for infantry.

Two hours for cavalry and light artillery.

Three hours for heavy artillery and for engineers with bridge train.

All movements of the troops in loading, entraining, and detraining, feeding and watering, and exercising men and horses are made, as far as practicable, in military formation and pursuant to command, thus avoiding confusion and saving time.

47. Conduct of the troops. Delays caused by the troops, whether in loading and entraining or during the journey are inexcusable. They interfere with railroad schedules and are a source of great annoyance.

The railroad employees and subordinate officials have nothing to do with the questions of military discipline and administration. Requests or complaints that they may have to make should be addressed to the station or to the conductor of the train for transmission to the commander.

The troops on their part must not interfere with the operation of the railway service. Officers and enlisted men give no orders to employees, and protests, complaints, and arguments are strictly prohibited. The commander is the sole intermediary between the troops and the railroad personnel. In case of deficiencies and other matters requiring correction, he addresses himself only to the official in charge.

The senior noncommissioned officer in each car is responsible for cleanliness and good order. Spitting on the floors, defacing woodwork and windows, and every species of disorder must be prevented.

The commander may station sentinels at the doors of each car to prevent the entrance of unauthorized persons and to keep soldiers from riding on the steps, platforms, or tops of cars, and from leaving

without permission. If it is desirable to exercise the troops, they should leave the cars in a body, under the officers.

Smoking is prohibited in cars loaded with animals or forage.

Careful attention is paid to the *messing* of the men, whether in kitchen cars or in the coaches where the men ride. A mess officer supervises the preparation and serving of the meals and requires the men to keep their mess kits scrupulously clean.

The commander causes frequent inspections to be made to see that his instructions for the preservation of cleanliness and good order are fully carried out.

When the stock cars provided are such that the animals can be fed and watered on the trains, it is unnecessary to unload them for exercise or recuperation unless the weather is very hot and the journey long. Should the railway company insist upon unloading the animals in compliance with the law, the commander will, in time of peace, give the necessary order.

On occasions when troops have been allowed or required to leave the train for exercise or duty, the commander will cause the "assembly" to be sounded five minutes before departure.

48. Detraining and unloading. The train *schedule* is arranged, when practicable, for arrival at destination in the morning. The troops are notified in time to prepare for detraining.

The officers and guard are the first to leave the cars. The commander meets the staff officer sent to the train, receives instructions, if any, gets his bearing, and orders the troops to detrain. As soon as the passenger coaches or sleeping cars are empty, the quartermaster, or a specially designated officer, accompanied by the conductor, if practicable, makes an *inspection* of the cars and notes their condition; the result is reported to the commander.

The troops procure their field kits and march to camp without delay, leaving details to bring up the property. If the camp is distant, arms are stacked and a part or all of the command unloads the train.

In the *cavalry* the men are marched to the vicinity of the stock cars, where the saddlebags and canteens are placed in line on the ground under guard. The remaining articles of the field kit and horse equipments are then unloaded and placed with the preceding articles. The horses are then unloaded, saddled, and the troops formed.

Animals are unloaded quietly, each one being led to the opening so that his body will be athwart the car before leaving it.

The command may be marched to camp at once, if near the station; otherwise picket lines are stretched, or the horses are held while the property is unloaded.

Artillery unloads in a manner similar to that of cavalry.

On account of accidents, freight blockades, or action of the enemy, it may be necessary to unload in the open country. In such cases portable or improvised ramps will have to be used. Lacking these, the train may be stopped in a low cut, and cross-ties, baled hay, car doors, and turf utilized for the rapid construction of ramps of sufficient height to permit unloading of animals.

49. Loading animals on cars. Except in hot weather, pack as many animals in the car as you can, as they will ride better than if loosely packed. If an animal happens to fall down in the car it will be almost impossible for it to get up, and the probabilities are it will be trampled to death. For this reason load sick or injured animals in cars by themselves, and build separate stalls for each animal, if practicable. Before loading examine each car carefully to see that the floor boards are not rotten or broken, that the sides are secure, and that there are no projecting nails or splinters. The car should be clean, and the floor covered with sand, sawdust or straw. Where cleats on the floor are not used it is advisable to have toe calks on the animals' shoes. The man in charge should be provided with a candle, lantern, bucket, and a hatchet. Where the boards on sides of car are not close together, an animal is liable to get his hoof between the boards, and when other means fail to disengage it, a hatchet is useful in cutting away a part of the board. In loading animals use the railroad platform, or the loading ramp found at railroad stations, or make a ramp, well supported and with strong sides. Lead the animals by halters and straps up the ramp and into the car, and take off the halter. The first animal should be led to one end of the car and the second to the other end, leaving the center of the car for the last animals loaded. Arrange the animals so that the alternate ones shall face in the same direction.

Do the loading quietly, and have the animals follow one another promptly, so as to avoid delay. In some cases it may be necessary to blindfold an animal before he can be led into the car. An obstinate animal can be made to enter by holding its head up, twisting its tail, and pushing it by main force into the car. Before loading see that the door on farther side of car is closed and fastened, and after loading is complete, fasten the second door.

Where cars contain hayracks and water troughs, see that they are in good condition, and fill racks before loading. Animals should be unloaded and exercised at least once in twenty-four hours.

They should be watered and fed twice a day.

50. Loading ambulances on cars. Except for short journeys, ambulances should be knocked down before loading. Secure a flat car 36 feet long by about 9 feet wide. Take the beds off the running gears by unscrewing nuts from the bolts that hold the sills of the beds to the running gears. Also take off the rear steps. Six beds can now be placed on the car by taking the first bed and placing it in one corner of the car (its length parallel to the car), the side of the bed coming out to the stakes, or the places for stakes on the side of car. Place the second bed alongside of the first, allowing it to slip back two inches on account of the sills. Arrange the other four beds behind the first pair, well closed up; then put in stout stakes and cover ambulance tops with paulins or old canvas, as a protection to the tops from sparks. It is very important that the nuts should be put back in their proper places. Secure the water tanks on ambulances, and place the running gears in a box car and number them corresponding to the ambulances, if the ambulances are of different makes.

For short journeys, take off wheels and rear steps and unyoke axles from springs. For the axles substitute a piece of hard wood, which should not be longer than the width of ambulance. Crate wheels and put inside of ambulance, bracing same, so there will be no liability of injury to sides.

51. Loading wagons on cars. Remove the beds from the running gears and take off the rear end gates. Get a 36-foot flat car, or even a longer one. Place the first bed in one corner of the car (its length parallel to the car), so that its side will come out to the stakes or places for stakes on side of car. Take the second bed, reverse it so that the front end shall be opposite rear end of first wagon, turn it bottom up, and place it partly inside and partly outside of the first bed, the inner sides being close together. This arrangement forms a box, with closed ends, which can be filled with parts of the body and running gear. Place the third and fourth boxes, similarly arranged, alongside of the first and second, and continue the same arrangement to the other end of the car. In this way, 12 beds can be put in first layer on car.

Arrange the second, third, and fourth layers similarly, and secure the beds by stout stakes and wire. Forty-eight beds, with parts, can

thus be shipped on one flat car, the running gears being placed in a box car. Put back all nuts in proper place. Wagons that have been used should never have the bodies knocked down and loaded in box cars, because in endeavoring to take off the nuts, which are sure to be rusted, the outside braces and inside straps are twisted and the bolt ends broken off, rendering the wagons unserviceable. By loading as above described, no damage is done the bed or running gear, and the wagons are easily set up when destination is reached. It is not necessary to number the beds, running gear, etc., except when wagons of different patterns are shipped. If tunnels are on the line of road, load only three layers, or 36 wagon beds on each car.

If cars containing stock and wagons accompany the regiment and it is necessary to run the train in several sections, the cars of stock and wagons should be the first section, and should be accompanied by a sufficient number of men, say one company, to unload and care for stock and wagons, so that when the rest of the regiment arrives there will be no delay in moving baggage to camp.

52. Loading property in cars. The general rule for loading property is to put in first such articles as will not be immediately needed on arrival at destination. The following order of loading should be followed, unless there is a special reason for departing from it:

Officers' baggage.

Enlisted men's baggage.

Ammunition.

Rations.

Hospital stores.

Tentage.

By this arrangement the articles needed first will be unloaded first. Keep the property of each organization by itself, and mark on the car the letter and regiment of the organization whose property is in the car. The cars should be assigned and marked by the quartermaster before loading. If the regiment is to be shipped in two or more sections, see that the proper baggage cars accompany each section, so that when an organization arrives in camp its baggage will be with it. A couple of men should be in each car to guard its contents.

53. Parking trains. When the wagons of a regimental train have been unloaded, they should be parked in one line, if practicable, dressed to the right, with an interval of two feet between hubs. The animals should then be unharnessed, watered, tied to picket line, and fed.

When the animals are fed from feed box fastened to wagon pole, increase the interval between hubs to 20 feet.

In a convoy, at the first sign of the presence of an enemy close up all the wagons and form a double column (columns of twos) if the ground will permit. This shortens the length of original column one-half. When the attack begins, or just before it, as the judgment of the commander dictates, form a park in the form of a square or circle, animals inside and their heads close together.

Now lock and fasten the wheels together. In the case of a large train, park the first fifty, bring up the rest of the train and make additional parks, so as to contract as much as possible the space to be defended. In some cases it may be necessary to move the train to the right or left to secure proper parking grounds. Where proper grounds for forming wagons into circles and squares can not be found, form a double column of wagons, and turn them so that the animals will face inward, their heads close together. To unpark, back the wagons out of the park and have them take proper place in column.

To form a circle from double column, the two leading wagons halt and the other wagons move outward to the right and left and come into the circle in their proper order. Light wagons, like ambulances and spring wagons, can be used to fill up any gaps there may be in the circle.

54. Care of animals, wagons, and harness in the field. In order that animals, wagons and harness should be always ready for service, it is very important that the Quartermaster should give them his personal attention. He can not delegate this responsibility to any one else, for he alone will be held responsible for their condition. He should give proper orders regarding the care of this property, and should see that his orders are executed.

55. Animals. Animals suffer from neglect on the part of those in immediate charge of them, either from failure to water and feed them, or by not examining their feet and promptly attending to slight injuries.

In the field all animals should be fed night and morning, the bulk of the feed being given at night, as the animals have more time to eat it than they have in the morning. The forage allowance is ample, and when animals are hard-worked this allowance should not be cut down.

Water the animals before feeding and at least once during the day if it is practicable to do so. Many teamsters after a hard day's

work neglect to water their animals, so that it is especially important to see that this duty is done.

Make a rule that the animals should be fed and watered before the men get their meals.

Have all animals thoroughly groomed at least once a day. In camp this should be done twice a day.

Feed the allowance of salt twice a week. When animals eat the wagon beds and feed boxes, or lick one another's hide, it is a sure indication that they are not getting enough salt.

The feet should be examined and cleaned every night. In a hot, dry country, if there is time to do so, their fore-feet should be poulticed with flaxseed twice a month.

Great attention should be paid to shoeing the animals. The blacksmith should fit the shoe to the foot, not the foot to the shoe. Have the animals shod as soon as they need it. The time for shoeing will be governed by the amount of work performed and the character of the roads. Ordinarily once in three or four weeks will be sufficient. Teamsters should report to the Quartermaster the condition of the shoes, and when camp is reached the blacksmith should attend to the animals at once. When it is necessary to have an animal shod on the march, turn the team out of the column, and instruct the teamster where and how to join the train.

Park the train at night and tie the animals to the wagons so that the grain may be fed to them in the feed box. Where a picket rope is used, see that it is securely fastened so as to hang about 4 feet from the ground, and that the halter is sufficiently long to allow the animal to lie down.

Animals' shoulders often become sore and the animals rendered unserviceable from the fact that the teamsters, when they take off the harness at night, instead of hanging it on a tree or putting it in the wagon, will throw it on the ground and make no attempt to clean the harness in the morning before using it. In consequence, dirt and mud get on the collars and harness and chafe the skin, resulting in sores that often take weeks to heal.

It would be well to wash the shoulders frequently in strong salt water.

Draft animals should not be driven out of a walk except in cases of urgent necessity. Exception is made in case of animals used on ambulances and spring wagons.

Impress upon teamsters that it is necessary to be kind to all animals. Discharge any man who kicks an animal or strikes him with a club or otherwise mistreats him.

56. Wagons. When wagons are used every day, especially in a sandy country, have the wheels greased once a day. One to one and one-half pounds of axle grease per wheel per month will be found to be ample in all climates.

It is of the utmost importance that the wheels should be kept thoroughly greased at all times, or the axle will be injured and the axle boxes worn out. Always carry with the wagon train a few extra wagon parts, so that minor repairs may be made at once.

The wagons should be inspected morning and evening to ascertain if anything is broken about them, that the tires are tight, axle nuts well screwed on, etc.

Scrape off all old grease before putting on fresh grease.

57. Harness. Harness should be examined every day. Note particularly if any stitches are broken, if any parts of the leather are worn thin, badly cracked, or cut, and if any of the buckles, toggles, snaps, hames, chains, bits, and rings are cracked or broken.

Should any defect or weakness be noticed, have the same remedied at once.

Do not allow the harness to be thrown on the ground where it will get muddy and dirty, for when the mud hardens and rubs against the skin sores will result that may render the animal unserviceable for weeks.

In stitching harness, see that knots are not left on any part of the leather which may come in contact with the animal's body.

Avoid these knots by using two double or back stitches at the beginning and end of each row of stitching.

Sew the harness and do not use rivets, especially if the leather has plenty of life and is not extra solid. Use the best linen shoe thread with wax ends in sewing.

The wax should be the spring, summer or winter kind, depending on the season. Buckle the collars when removed from the animals.

CLEANING HARNESS

Harness should be cleaned at least twice a month, and whenever it gets muddy.

For this purpose use a bucket, lukewarm water, sponge, harness soap, harness dressing, neat's-foot oil, and lampblack.

For ordinary cleaning the following instructions should be observed:

Provide a rack to hang the harness on. Where no better arrangement is on hand, insert one end of the wagon pole between the spokes of one of the hind wheels, above the hub, and strap it to the axle.

Hang a set of harness on the pole, dampen the sponge in clean water and pass it over the harness until the dirt has become soft.

Rinse out the sponge as often as necessary, and replace the dirty water with clean water frequently.

Now rub the sponge on the harness soap until you obtain a good lather, then give the harness a good heavy coating of it, and keep rubbing the harness until all dirt is removed. In some instances it may be necessary to use a thin piece of wood to remove the dirt. After the harness is thoroughly clean, work up a very thick lather, coat the leather parts of the harness with it, and allow it to dry without further rubbing.

After the lather has been absorbed and the leather is dry, put on a light coat of harness dressing. To do this, use a perfectly clean sponge, touch the harness lightly, just enough to spread the dressing, and do not rub. Keep the dressing in an air-tight package when not in use.

When the harness has not been cleaned for some time, and is hard, it should first be cleaned as described above. Afterwards take a pint of neat's-foot oil for each single set of harness to be cleaned, pour it into a pan and mix with it lampblack in the proportion of one teaspoonful to each pint of oil, and stir this mixture until it has a glossy black appearance. In cold weather heat the oil until it is lukewarm, but never hot, before using on harness. Apply the mixture with a small sponge, rubbing it well in. Allow about forty-eight hours to elapse before using harness again. In cold weather allow harness, after being thus oiled, to hang near a fire for an hour.

After the leather is thoroughly dried, apply harness dressing as described above.

CHAPTER VII

MARCHES

58. Protection. Protection for troops on the march is provided by means of advance guards, rear guards, and flanking parties or patrols.

59. Rate of march. The rate of march varies with the length of march, kind of troops, equipment carried, size of command, condition of troops, state of the weather, condition of roads, and other circumstances. However, whatever the rate may be it should be *uniform*, that is most important, as there is nothing that will irritate and tire a command more than a varying, un-uniform rate of march.

The rate of march is regulated by the commander of the leading company or some one designated by him, who should give the matter special attention, *the rate being checked from time to time by a watch.*

On a march of several days' duration the position of companies is ordinarily changed daily, so that each in turn leads.

With trained troops, in commands of a regiment or less, marching over average roads, the rate should be from $2\frac{3}{4}$ to 3 miles per hour. With larger commands carrying full equipment, the rate will be from 2 to $2\frac{1}{2}$ miles per hour.

Assuming that the length of step of the average man is 30 inches, the following rate-of-march table is deduced:

Steps per minute	Miles per hour
35 (1/5)	1
70	2
88 (in practice, 90)	$2\frac{1}{2}$
97 (in practice, 100)	$2\frac{3}{4}$
106 (in practice, 110)	3

[NOTE. By remembering that 35 (1/5) steps per minute gives 1 mile per hour, the number of steps per minute necessary to give a rate of 2, $2\frac{1}{2}$, $2\frac{3}{4}$ and 3 miles per hour, is quickly and easily obtained by multiplying 35 (1/5) by these numbers.]

In hot, sultry weather, with the men carrying the full pack, the rate of march would naturally be considerably less than on a cool day, with the command not carrying the pack. It is most important that these and other considerations affecting the rate of march be constantly borne in mind by the officer in command of the column, who should indicate to the commander of the leading company the number of steps to be taken per minute. In indicating the number of steps to be taken per minute, it should be considered whether the men at the head of the leading company are the average, above the average, or below the average in height. A short man, for example, would probably have to take 100 steps a minute to keep up with a tall man walking at the rate of 90 steps per minute.

60. Marching capacity. The average marching capacity of Infantry is about 15 miles a day, but in extensive operations, involving large bodies of troops, the average is about 12 miles a day. Small commands of seasoned Infantry marching on good roads in cool weather can average about 20 miles a day.

61. Halts. A halt of 15 minutes should be made after the first half or three quarters of an hour of marching to enable the men to attend to the calls of nature and adjust their clothing. Judgment must be exercised in selecting the place for this halt; it should not be made in a village or other place where its object would be defeated.

After the first halt a halt of 10 minutes is made in each hour, that is, the troops march 50 minutes and then halt 10. Of course, the number and length of halts should be varied according to the weather, condition of the roads and the equipment carried by the men. In the tropics the best results are often obtained by marching 45 minutes and halting 15.

When the day's march will run well into the afternoon, a halt of about one hour should be made at noon and the men allowed to eat.

Places for long halts should be selected with care; woods, water and shade are desirable features. Arms are stacked and equipments removed.

Halts should not be made in or near towns or villages unless to procure water or supplies, and when so made, the men remain in column, details being sent for whatever is necessary.

In hot weather, especially in the tropics, it may be advisable in the case of long marches to halt for three or four hours during the hottest part of the day and finish the march in the late afternoon or early evening. As a general proposition, however, it is inadvisable to arrive at a strange place after nightfall or even late in the afternoon.

62. Straggling and elongation of column. The marching efficiency of an organization is judged by the amount of straggling and elongation of the column and the condition of the men at the end of the march.

An officer of each company marches in its rear to prevent undue elongation and straggling. If there be only one officer with a company, the first sergeant performs this duty.

No man should leave the ranks without permission. If necessary for a man to fall out on account of sickness, he should be given a permit to do so by the company commander or the officer at the rear of the company. This permit is presented to the surgeon, who will admit him to the ambulance, have him wait for the trains, or follow and rejoin his company the first halt.

It is the duty of all officers and all noncommissioned officers to prevent straggling and elongation of the column.

63. Compliments. As a rule, troops on the march pay no compliments; individuals salute when they address, or are addressed by, a superior officer.

64. Fitting of shoes and care of feet. In view of the fact that the greater part of the Infantry soldier's occupation in the field consists of marching, too much stress cannot be laid upon the importance of his paying special attention to the fitting of his shoes and the care of his feet.

An Infantryman with sore feet is like a lame duck trying to keep up with the rest of the flock.

Keep your feet clean. Dirty feet invite blisters. An excellent preventative against sore feet is to wash them every night in hot (preferably salt) water and then dry them thoroughly. If this is not practicable, then mop them every evening with a wet towel and invigorate the skin with a good rubbing.

Keep the nails cut close.

Rubbing the feet with hard soap, grease, or oil of any kind, and putting ordinary talcum powder in the shoes before starting on a march, are very good to prevent sore feet.

Blisters should be pricked and the water let out, but the skin must never be removed. Adhesive plaster on top of the blister will prevent the skin from being pulled off.

In case of sore or blistered feet, considerable relief can be obtained by rubbing them with tallow from a lighted candle and a little whiskey or alcohol in some other form, and putting the socks on at once.

A little alum in warm water is excellent for tender feet.

The old soldier has learned from long experience in marching, to turn his socks inside out before putting them on thus putting the smooth side next to his skin and possible seams or lumps next to the shoe. The thickness of the sock protects the skin and helps prevent blisters.

Under no circumstances should a soldier ever start on a march with a pair of new shoes.

Each soldier should have on hand at all times two pair of serviceable shoes well broken in.

Remember that it is much better to prevent sore feet by taking the precautions outlined above, than it is to have to treat your feet after they have become sore.

65. March orders for individuals. The following orders should be learned by every soldier:

I will fill my canteen before the march starts.

I will never go on a march with a pair of new, unbroken shoes. I will always wear serviceable, broken shoes that fit properly, with good shoe laces.

I will make it a special point to wear socks that fit properly and that have no holes or rough seams.

If I have blisters, or get them easily, I will sprinkle the inside of my socks and shoes well with Talcum or foot powder before starting.

As marching constitutes the principal occupation of troops in campaign, I realize the great importance of a soldier being able to march, and, therefore, the importance of looking after his feet. I will, therefore, at all times take the best possible care of my feet.

Whether sick, or whether to get water, or for any other reason, I will never leave ranks without permission of my company commander, and during halts I will not leave the immediate vicinity of the company without permission.

Should I wish to relieve myself when the company halts, I will do so as soon as the halt is made and not wait until it is nearly over.

Under no circumstances will I ever straggle, but I will always keep my proper place in the column.

I will not eat on the march.

Before starting on a march I will thoroughly quench my thirst. On the march I will not drink any more water than I have to in order to replace the loss by perspiration. No matter how thirsty I may be, or how plentiful the water may be, I will drink only a few small swallows at a time. Water that is drunk is absorbed at once into the blood, and

65 (contd.)

if the amount is excessive, a strain is imposed upon the heart that is likely to result in faintness or muscular cramps.

I will not sit on damp ground during halts. I will always place a board, twigs, grass, or something else on damp ground before sitting on it.

At every halt I will at once sit down and rest, removing my pack, or loosening it, and resting my back against it on the ground.

I will not enter yards, orchards, or gardens, during halts, nor will I ever enter a house unless invited to do so by the occupants.

When the command is given to fall in after a halt, I will fall in promptly.

CHAPTER VIII

CAMPS

66. Principles governing selection of camp sites. The following basic principles govern in the selection of camp sites:

- (a) The water supply should be sufficient, pure, and accessible.
- (b) The ground should accommodate the command with as little crowding as possible, be easily drained, and have no stagnant water within 300 yards.
- (c) There should be good roads to the camp and good interior communication.
- (d) Camp sites should be so selected that troops of one unit need not pass through the camp grounds of another to reach their own camp.
- (e) Wood, grass, forage, and supplies must be at hand or obtainable.
- (f) In campaign, tactical considerations come first in the selection of camp sites, capability of defense being especially considered, and, as a result, troops may have to camp many nights on objectionable ground.
- (g) However, sanitary considerations must always be given all the weight possible consistent with the tactical requirements. Through no fault of their own, troops occupying an unsanitary site may suffer greater losses than in the battles of a long campaign.

67. Desirable camp sites. The following conditions are desirable for camp sites:

- (a) Porous soil, covered with stout turf and underlaid by a sandy or gravelly subsoil.
- (b) High banks of rivers, provided no marshes are near.
- (c) In cold weather, a southern exposure, with woods to the north to break the cold winds.
- (d) In warm weather, an exposure toward the prevailing winds, with site moderately shaded by trees.

68. Undesirable camp sites. The following conditions are undesirable for camp sites:

- (a) Clay soil, or where the ground water approaches the surface, such sites being damp and unhealthful.
- (b) Alluvial, marshy ground, and ground near the base of hills, or near thick woods or dense vegetation are also damp.

(c) Ravines and depressions are likely to be unduly warm and to have insufficient or undesirable currents.

(d) Proximity to marshes or stagnant water is usually damp, and has mosquitos, which transmit malaria, dengue fever and yellow fever.

(e) Old camp sites are dangerous, as they are often permeated by elements of disease which persist for considerable periods.

(f) Dry beds of streams are subject to sudden freshets.

(g) In the tropics troops should not camp nearer than 500 yards to native huts or villages because of danger from malarial infection.

69. Form and dimensions of camps. The form and dimensions of camps depend upon the tactical situation and the amount and nature of ground available. However, in general, the form and dimensions of a regimental or battalion camp should conform as nearly as practicable to the diagram on the opposite page, and camps of all sizes should, as far as possible, conform to the principles, regarding arrangement, underlying the diagram given on the opposite page, which gives the general form, dimensions, and interior arrangements of a camp for a regiment of Infantry at war strength. In certain cases, particularly in one-night halts in the presence of the enemy, camps must of necessity be contracted, while in other cases, where a more extended halt is contemplated and where tactical reasons will permit, better camp sanitation may be secured, and a more comfortable arrangement made by the expansion of camp areas.

70. Making camp. The command should be preceded by the commanding officer or a staff officer, who selects the camp site, and designates, by planting stakes, the lines of tents, the positions of the sinks, guard tent, kitchens, picket line, etc.

After the companies are marched to their proper positions and arms are stacked, the details for guard and to bring wood, water, dig sinks, pitch tents, handle rations, etc., should be made before ranks are broken.

Immediately upon reaching camp and before the men are allowed to go around, patrolling sentinels should be established to prevent men from polluting the camp site or adjoining ground before the sinks are constructed.

Sentinels should be posted over the water supply without delay.

As soon as the tents have been pitched and the sinks dug, the camp should be inspected and all unnecessary sentinels relieved.

The tents should be pitched and the sinks dug simultaneously.

Should the troops reach camp before the wagons, the companies may be divided into squads and set to work clearing the ground, gathering fire wood, collecting leaves, grass, etc., for beds, etc.

The moment a command reaches camp its officers and men usually want to go here and there under all sorts of pretexts. No one should be allowed to leave camp until all necessary instructions have been given.

Enlisted men should not be permitted to leave camp without permission of their company commanders.

Sick call should be held as soon as practicable after the tents have been pitched.

MISCELLANEOUS

71. Retreat. In camp retreat formation should always be under arms, an officer being present with each company and inspecting the arms.

72. Parade ground. In front of every camp of permanent nature, there should be a parade ground for drills and ceremonies.

73. Camping on fordable stream. In camping for the night on a fordable stream that is to be crossed, cross before going into camp, unless there is some tactical reason for not doing so; for a sudden rise, or the appearance of the enemy, might prevent the crossing the next morning.

74. Windstorms. Whenever windstorms are expected, the tent pegs should be secured and additional guy ropes attached to the tents.

Tents may be prevented from blowing down by being made fast at the corners to posts firmly driven into the ground, or by passing ropes over the ridge poles and fastening them to pegs firmly set into the ground.

75. Making tent poles and pegs fast in loose soil. If the soil be loose or sandy, stones or other material should be placed under the tent poles to prevent their working into the soil, thus leaving the tent slack and unsteady. When the soil is so loose that the pegs will not hold at all, fasten the guy ropes to brush, wood or rocks buried in the ground.

76. Trees sometimes dangerous. While trees add very much to the comfort of a camp, care should be exercised not to pitch tents near trees whose branches or trunks might fall.



The Camp Fire Crane.

77. Improvised conveniences. It is surprising to what extent, with a little ingenuity and hustling, one can improvise with material available in the field, various articles, such



Camp Broom.

as brooms, candlesticks, heating devices, etc., which, to all practical purposes, answer their purpose in every way.

Field service offers excellent opportunity for the exercise of *initiative* and *individuality*, and every man should be "a natural born hustler," bearing in mind the injunction that, "The Lord helps those who help themselves."

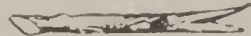
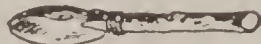
78. A good camp lamp can be made by using clear tallow fat, (fat of animals), melted down and put in an old tin can. Improvise a wick from unravelled cotton or tent canvas, put one end in can and the other end on edge of can and wire.



Camp Pot, Hook and Poker.

79. A good camp candlestick. A safe one can be improvised from a potato with a hole in it—bottom sliced off so it will stand firmly—or an old can partly filled with dirt.

80. A good camp spoon, knife and fork can be made from a shell and split stick. A fork can easily be whittled, and a good knife made from a piece of tin cut from an old can and inserted in a split stick; lash it tight with wire.



81. A good dinner plate or cooking utensil, from a piece of green thick barked tree, using smooth part for food.



82. Any old tin can. Top carefully burnt out over camp fire, then scoured makes a good cup or small cooking utensil. Make handle of wire as shown in illustration.



83. Frying or broiling without utensils. Use the green, thick bark

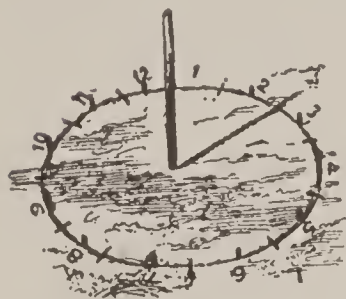


The Bark Plate and Broiler

of a tree, rough side down on fire. Use the camp fire tongs (as illustrated on page 264) or make a toaster and broiler as shown, from a

stick having a split end which will hold the meat over a hot coal fire. Don't pierce the meat.

Always carry a small bag of salt in the haversack.



84. A reliable camp clock. A very accurate one can be improvised by making a sun dial of a piece of stick stuck in the earth where the sun's rays can cast the shadow of the stick on the ground. You can mark the ground most accurately if one of your party has a watch. Then the clock will serve you well, when the man with the watch is gone.

85. Don't spoil a good knife. In opening tin cans in camp, take the camp axe. Cut a cross in the center and open the cuts afterward, but not with the fingers.

86. To heat a tent without a stove. Build a camp fire near tent opening, surround it partly with a radiator of logs, bark of tree or brush, so as to throw the heat inside.

Another Way. Throw into camp fire a lot of stones, the larger the better, let them get red hot, put into bucket and carry into tent, invert the bucket over them, and it will surprise you. With a change of stones in the fire you can renew and keep warm all night long;—or use camp kettle.



Still Another Way. (Perfectly safe if common sense is used). Dig a pit half a bucket in size somewhere in the tent. Fill it heaping full of red hot clear coals (embers) from the camp fire, taking care no unburnt or smoky wood is therein. Now cover this with the kettle or pail. With mud, plaster up the edges, and it will keep your tent and you warm all night long. Use camp pails (iron of course).

And Still Another Way. Dig a trench from interior of tent to a fire in a hole outside of tent, covering the trench with old pieces of tin, sod, etc. To heat all the space in the tent, dig a trench all the way through the tent, having the fire at one end of trench and the chimney at the other, both fire and chimney, being, of course, outside. The hot air passing through the trench-flue will keep the tent warm.

87. In case of fire in tent. If serious, lay hold of the bottom of the bedding and pull out, and with a blanket smother the fire quickly. If fire is caught in time you can smother it.

Let the tent go, but save the outfit herein, if possible. You can improvise shelter but not the outfit, so save that part first.

88. To find out correctly how the winds blow. If the wind is very light, place your finger in your mouth for a minute, moisten it, then hold it in the air. The coolest side indicates the direction from which the wind blows.



89. A good fire shovel. Can be made of a piece of tin and a split stick; it is also an excellent broiler.

90. How to sleep warm. Sheets of paper, or an old newspaper sewed between two blankets, equals three blankets. A thin vest lined with paper equals two.

In cold weather, it is most important both for comfort and health that the extremities be kept warm at night. A sweater with high rolling collar, a pair of heavy woolen socks and a woolen knitted nightcap are excellent for this purpose, being equivalent to two or three blankets.

The feet may be kept warm by inclosing them in paper bags, tied around the ankles.

91. Chafing. If the seams of underwear chafe or gall the skin, turn inside out. Common corn starch is a most excellent talcum or chafing preventative and cure.

92. If soaking wet. If soaking wet and no dry clothes handy take off wet garments and wring them out as dry as possible—put on again,—you are less liable to take cold, and will be much warmer besides.

93. Burn up all kitchen and table refuse. Even potato skins and wet tea or coffee grounds, burn out even tin cans in the camp fire, if thrown out they are fly and maggot breeders, and mean lots of flies in camp. Burnt out and thrown aside they are harmless.



Camp
Fire
Tongs.

94. To test the freshness of meats, game, etc. Thrust knife blade into center of flesh—remove the blade; your nose to the knife blade will do the rest. Meat is often fresh outside when the inside is not. Your nose can't tell inside—the knife blade can.

95. For washing flannels and woolens. Don't wring out, hang them up dripping wet and they won't wrinkle up or shrink.

96. To keep fresh meats, game, etc. By hanging in old sack, sack opening downward; secure with cord, tied to legs of game; then take a few branches of leaves and cover; the rustle of these leaves will help keep the flies away and the meat cool. Fasten the bottom opening with splinters of wood, so you can get at meat without trouble.

97. Biscuit cutter and rolling pin. The tin baking powder can cover makes an excellent biscuit cutter and any bottle a good rolling pin—even an unopened can.

98. To cool water. Any old well soaked cloths, wrapped around outside of bottle or bucket will, if hung in the shade, help cool contents. Remove the cork.

Water may also be cooled by wetting the canteen and then hanging in a cool place.

99. Clothes hanger. A wire or rope stretched across upper part of the vertical tent poles makes a good clothes hanger.

100. Hot water bottle. A canteen filled with boiling water is a foot warmer (a hot water bottle for your camp bed), that insures you the warmth of an extra blanket, and is invaluable in emergencies of camp sickness.

101. Life preservers. Three or four empty canteens, tightly corked and fastened together, make a very good life preserver.

102. A good camp bed for tents, or tent carpet. Take fine ends of any branch clippings, and plenty of them. Commence at the head of tent, lay rows of them butts to the rear, in successive layers. If this is done right and carefully and ends locked with a log rolled on so as to hold end in place, an extremely soft bed is the result. Over this spread a piece of canvas or blanket.

103. If thirsty and can't find water. Place a pebble or button in the mouth and keep it there; it will surprise you with the result, and relieve that dryness entirely—try it.

104. Lost in camp. When you find you have lost your way, don't lose your head—keep cool; try and not let your brains get into your feet. By this, we mean, don't run around and make things worse, and play yourself out. First: Sit down and think; cool off, then climb a tree, or hill, and endeavor to locate some familiar object you passed, so as to retrace your steps. If it gets dark, build a rousing camp fire. Ten to one you will be missed from camp, and your comrades will soon be searching for you, and your fire will be seen by them. Give distress signals, but don't waste all your ammunition thus. It's ten to one morning and a clear head, after a comfortable

night (if you make it so), will reveal to you the fact that your camp is much closer to you than you imagined.

To locate position—note the limbs and bark of trees—the north side of trees can be noted by the thickness and general roughness. Moss most generally is to be found near the roots on the north side. Note also, limbs or longer branches, which generally are to be found longer on south side of trees, while the branches exposed to the north most generally are knotty, twisted and drooped. In the forest the tops of the pine trees dip or trend to the north; also: If you find water, follow it; it generally leads somewhere—where civilization exists. The tendency of people lost, is to travel in a circle uselessly; by all means, keep cool, and deliberate. Blaze your way, by leaving marks on trees to indicate the direction you have taken.

105. To make a fire without matches. Take a dry handkerchief or cotton lining of your coat, scrape out a very fine lint, a few handfuls, by using the crystal of your watch, compass or spectacle, a sun glass can be made that will ignite the lint, which can be blown to fire.

Another Way. Sprinkle powder of cartridge as a fuse to the cotton lint, and with the cartridge percussion cap you can easily ignite the lint, dry moss, leaves, etc.

Still Another Way. Take scrapings of very fine pine wood, find a piece of quartz or hard ragged rock, by using your knife or bayonet as a steel you have a practical flint and steel. If you haven't these things, use two pieces of rough, jagged stone and by striking them together sharply in slanting blows you can ignite the lint or scrapings.

106. To dry inside of wet boots, shoes, etc. The last thing at night take a few handfuls of clean dry pebbles, heat them in frying pan, kettle or campfire until very hot, place them in the boots or shoes, they will dry them out thoroughly in a few hours, shake once in a while. Oats or corn may also be used, but they are not available always and pebbles are. Now is an excellent time to grease or oil them.

107. To make a good camp lantern. From any ordinary clear glass bottle, if the bottle is long necked. Heat a piece of wire red hot, and wrap it around the part below the neck, the wide part, submerge the neck into a bucket of water and it will cut the part surrounded by the hot wire as smooth and clean as if cut to order. Now wire a handle to carry it by, with a loop over the bottom, fill $\frac{1}{4}$ full with moist dirt or sand, forming a hole therein with a round stick, insert your piece of candle in this hole, cover with a piece of old tin

can top (perforated with holes) and you have a good outside camp lantern.

108. To keep matches dry. Cork a few in a small bottle.



109. To correctly ascertain the points of the compass. Face the sun in the morning; spread out your arms straight from the body—before you is east, behind you the west, to your right hand, the south, left, north, (accurately.) If the sun don't shine, note the tops of pine trees, they invariably dip to the north. (See also lost in camp).

109½. Bathing. Be careful about bathing in strange places. Don't dive; weeds may be at bottom or sharp rocks. Water that looks inviting often is full of treacherous, slimy weeds in which once caught it is almost impossible to get free. Look out for deep unseen mud holes. Better splash water over body than to take big risks.

110. Drying clothes in cloudy weather. Build a dome-shaped work by bending twigs into a half circle, with ends in ground, over a smoldering fire, and place the clothes on the bent twigs.

111. Fording streams. In case of a quick-sand bottom, send in a few men on foot to find a solid place. Stakes are then driven to mark the way, and the command crosses the stream. Wagons should not stop while crossing a stream, for in case of soft bottoms, they will likely get bogged.

Mules should always be watered before starting to cross a stream—otherwise they will very likely stop to drink, and the wagon may get stuck.

It is well to remember that the shallowest water is generally found from one salient—that is, one projecting point—of the bank to another, diagonally across. The bends and hollows or re-entrants usually have the deepest water.

112. To cross an unfordable stream. If narrow, try to construct a bridge of some kind, or make a temporary crossing by felling trees opposite to each other on opposite sides.

Wagon bodies covered with canvas or wagon sheets, lashed at the ends and fastened, make good boats.

CHAPTER IX

CAMP SANITATION

113. Definition. By "Camp Sanitation" is meant the adoption of measures to keep the camp in a healthy condition. These measures comprise:

- (a) The disposal, so as to render them harmless and prevent pollution, of all wastes, refuse and excreta from men and animals in suitable places provided therefore;
- (b) The care exercised in handling, preparing and serving food;
- (c) The adequacy of shelter for the men;
- (d) The maintenance of proper drainage;
- (e) The supply of water for bathing and washing, and the maintenance of a pure supply for drinking.

114. Camp expedients. "Camp expedients" is the name given the mechanical means used to put into effect some of the measures, named above, connected with camp sanitation, and usually consist of latrines, kitchen sinks, urinal tubs, rock or earth incinerators, and drainage ditches.

115. Latrines. The latrines must be dug immediately upon reaching camp—their construction must not be delayed until the camps have been pitched and other duties performed. The exact location of the latrines should be determined by the commanding officer, or by some officer designated by him, the following considerations being observed:

1. They should be so located as not to contaminate the water supply.
2. They should not be placed where they can be flooded by rain water from higher ground, nor should they be so placed that they can pollute the camp by overflow in case of heavy rains.
3. They should be as far from the tents as is compatible with convenience—if too near, they will be a source of annoyance; if too far, some men, especially at night, and particularly if affected with diarrhœa, will defecate before reaching the latrine. Under ordinary circumstances, a distance of about 50 yards is considered sufficient.

Latrines for the men are always located on the opposite side of the camp from the kitchens, generally one for each company unit and one for the officers of a battalion or squadron. They are so placed that the drainage or overflow can not pollute the water supply or camp grounds.

When the camp is for one night only, straddle trenches suffice. In camp of longer duration, and when it is not possible to provide latrine boxes, as for permanent camps, deeper trenches should be dug. These may be used as straddle trenches or a seat improvised. When open trenches are used the excrement must be kept covered at all times with a layer of earth. In more permanent camps the trenches should be 2 feet wide, 6 feet deep, and 15 feet long, and suitably screened. Seats with lids are provided and covered to the ground to keep flies from reaching the deposits; urinal troughs discharging into trenches are provided. Each day the latrine boxes are thoroughly cleaned, outside by scrubbing and inside by applying, when necessary, a coat of oil or whitewash. The pit is burned out daily with approximately 1 gallon oil and 15 pounds straw. When filled to within 2 feet of the surface, such latrines are discarded, filled with earth, and their position marked. All latrines and kitchen pits are filled in before the march is resumed. In permanent camps and cantonments, urine tubs may be placed in the company streets at night and emptied after reveille.

All latrines must be filled before marching. The following illustration shows a very simple and excellent latrine seat which can be made and kept in the company permanently for use in camps on the march:

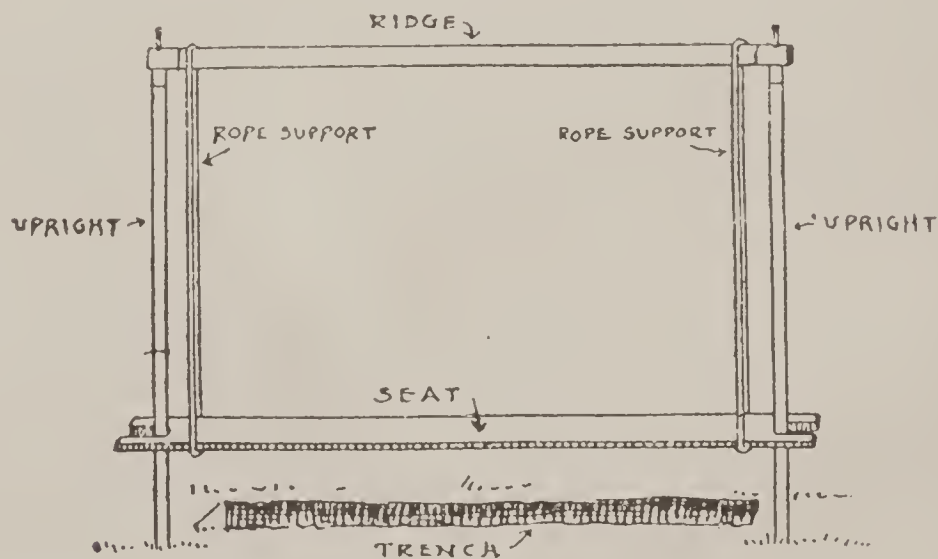


Fig. 1

Urinal troughs, made of muslin and coated with oil or paint, should discharge into the trenches.

116. Urinal tubs. When obtainable, urinal tubs or cans should be placed in the company streets at night, their location being indicated by lighted lanterns, the tubs or cans being removed at reveille.



Fig. 2

117. Kitchens. Camp kettles can be hung on a support consisting of a green pole lying in the crotches of two upright posts of the same character. A narrow trench for the fire about 1 foot deep, dug under the pole, not only protects the fire from the wind but saves fuel.

A still greater economy of fuel can be effected by digging a similar trench in the direction of the wind and slightly narrower than the diameter of the kettles. The kettles are then placed on the trench and the space between the kettles filled in with stones, clay, etc., leaving the flue running beneath the kettles. The draft can be improved by building a chimney of stones, clay, etc., at the leeward end of the flue.



Fig. 3



Fig. 4

Four such trenches radiating from a common central chimney will give one flue for use whatever may be the direction of the wind.

A slight slope of the flue, from the chimney down, provides for drainage and improves the draft.

The lack of portable ovens can be met by ovens constructed of stone and covered with earth to better retain the heat. If no stone is available, an empty barrel, with one head out, is laid on its side, covered with wet clay to a depth of 6 or more inches and then with a layer of dry earth equally thick. A flue is constructed with the clay above the closed end of the barrel, which is then burned out with a hot fire. This leaves a baked clay covering for the oven.

A recess can be similarly constructed with boards or even brushwood, supported on a horizontal pole resting on upright posts, covered and burnt out as in the case of the barrel.

When clay banks are available, an oven may be excavated therein and used at once.

To bake in such ovens, first heat them and then close flues and ends.

Food must be protected from flies, dust, and sun. Facilities must be provided for cleaning and scalding the mess equipment of the men. Kitchens and the ground around them must be kept scrupulously clean.

Solid refuse should be promptly burned, either in the kitchen fire or in an improvised crematory.

In temporary camps, if the soil is porous, liquid refuse from the kitchens may be strained through gunny sacking into seepage pits dug near the kitchen. Flies must not have access to these pits. Boards or poles, covered with brush or grass and a layer of earth may be used for this purpose. The strainers should also be protected from flies. Pits of this kind, dug in clayey soil, will not operate successfully. All pits should be filled with earth before marching.

As a precautionary measure against setting the camp on fire, all dry grass, underbrush, etc., in the immediate vicinity of the kitchen should be cut down.

In case of a fire in camp, underbrush, spades, shovels, blankets, etc., are used to beat it out.

Gunny sacks dipped in water are the best fire fighters.

Burning away dried grass and underbrush around exterior of camp is a great protection against fire from outside.

118. Kitchen pits. Pits of convenient size should be constructed for the liquid refuse from the kitchens. Solid refuse should be burned either in the kitchen fire or at some designated place, depending upon whether the camp is of a temporary or permanent nature. Unless the camp be of a very temporary nature, the pits should be covered with boards or other material in order to exclude the flies.

All pits should be filled in with earth before breaking camp.

119. Incinerators. The incineration pit shown in Fig. 5 on the following page affords an excellent, simple and economical way of disposing of camp waste and offal, tin cans and dish-water included.

Description:

The pit is about $4\frac{1}{2}$ feet long, $1\frac{1}{2}$ feet wide and 2 feet deep at one end and $2\frac{1}{2}$ at the other. It is partially filled with stones, the larger ones on the bottom and the smaller on the top. At one end of the pit the stones extend a little above the surface, and slope gradually toward the other end until the fire pit is reached ten inches below the surface of the trench. Over the fire pit, about five inches above the ground, is placed a crab or a piece of boiler iron, on which is boiled all the water for washing dishes, etc. The fire pit is only about one-half of the stone surface, as the radiated heat keeps the rest of the stones hot, causing all dish and slop water to evaporate quickly.

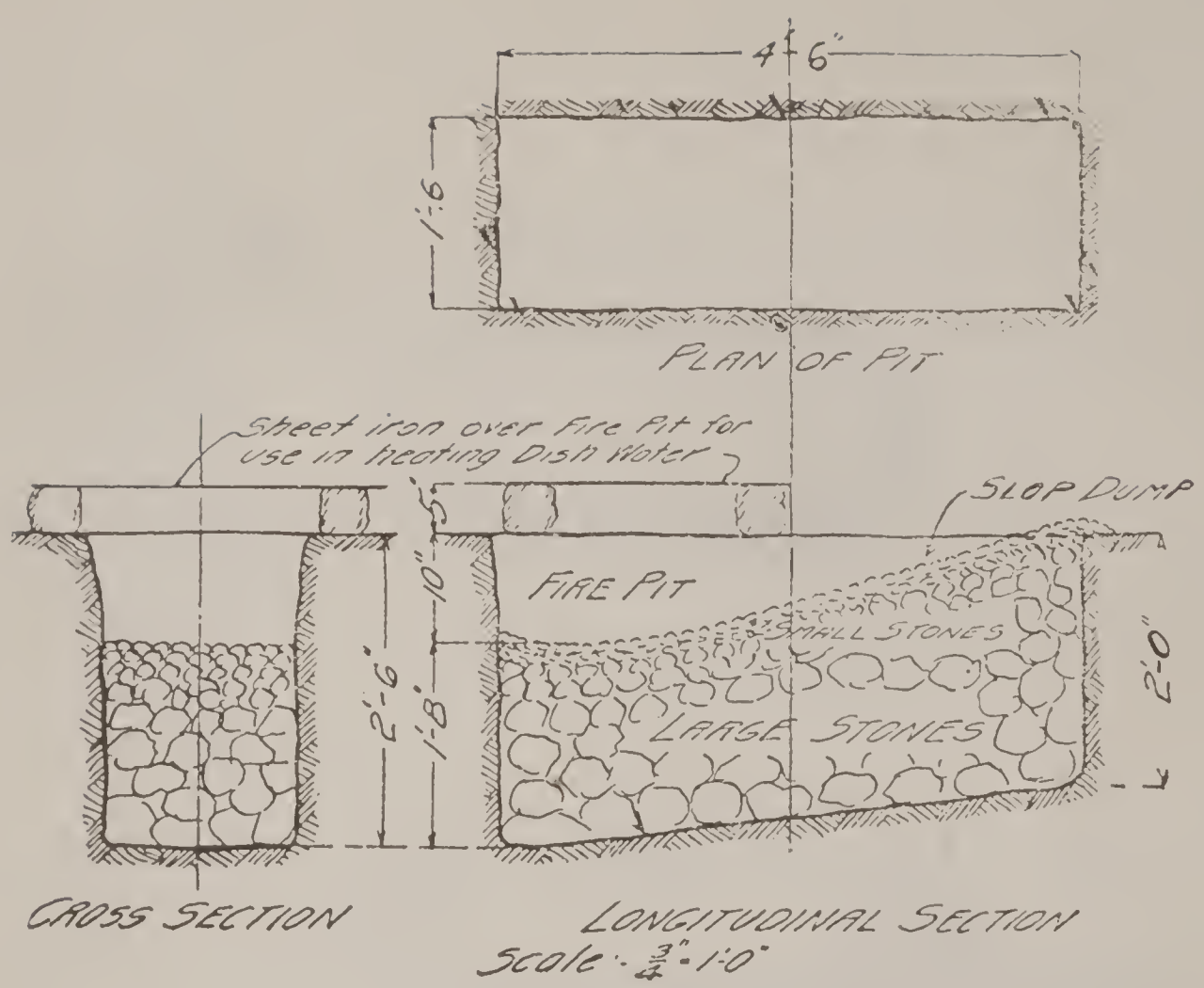


Fig. 5

Any tin cans that may be thrown into the fire pit are removed after a short exposure to the heat and placed in a trench especially dug for the purpose.

The company incinerator shown below was used with great success by some of our troops at Texas City, Texas. The rocks should not be too large. The men should be instructed to drop all liquid on the sides of the incinerator and throw all solid matter on the fire—the liquids will thus be evaporated and the solids burned. Until the men learn how to use the incinerator properly, a noncommissioned officer should be detailed to supervise its use.

120. Drainage. When camp is established for an indefinite period, drainage should be attended to at once. Each tent should have a shallow trench dug around it and the company and other streets ditched on both sides, all the trenches and ditches connecting

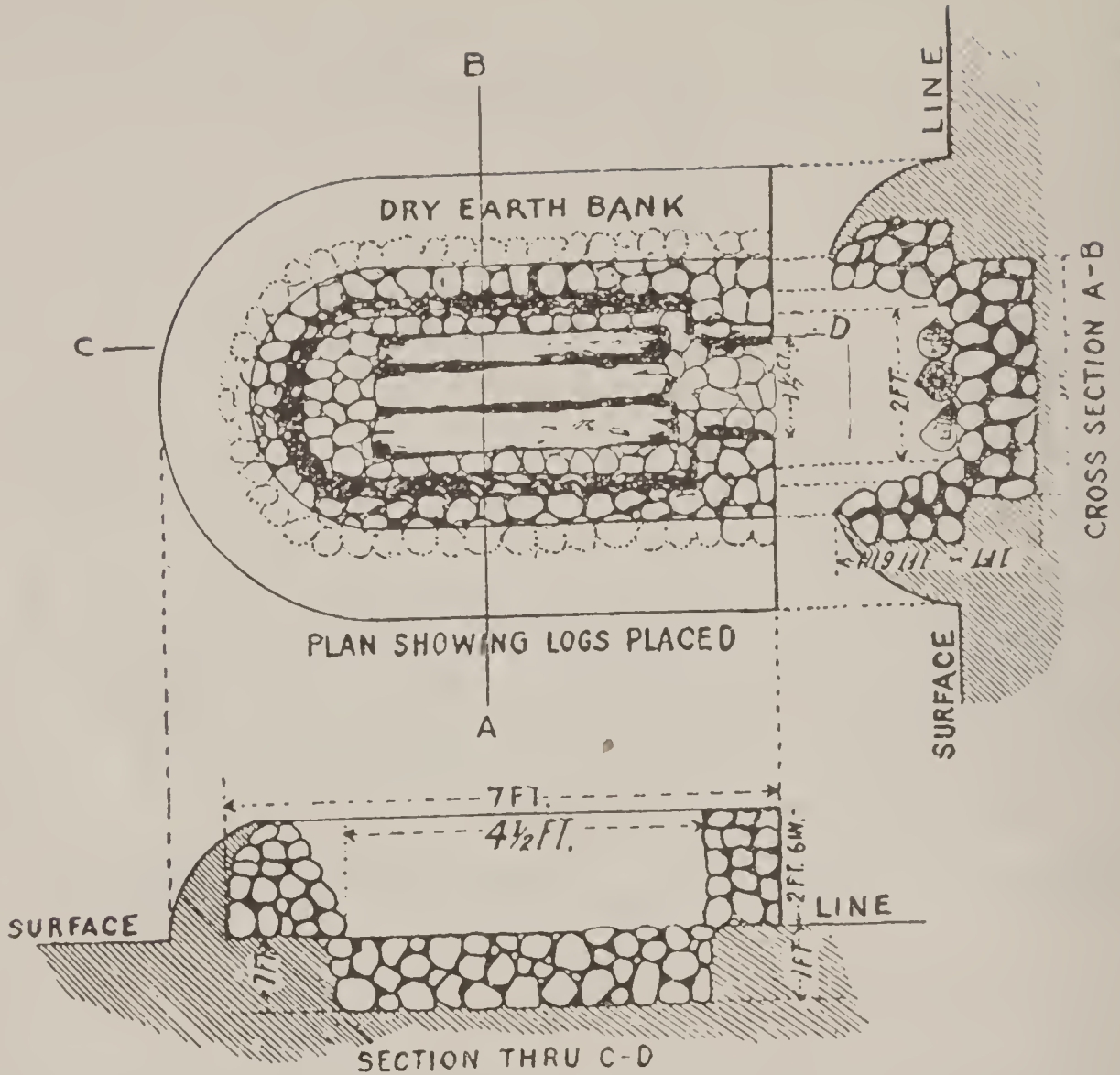


Fig. 6

with a ditch that carries the water from the camp. All surface drainage from higher ground should be intercepted and turned aside.

121. Avoiding old camp sites. The occupation of old camp sites is dangerous, since these are often permeated by elements of disease which persist for considerable periods.

122. Changing camp sites. Camp sites must be changed promptly when there is evidence of soil pollution or when epidemic disease threatens. Also, a change of camp site is often desirable in order to secure a change of surroundings and to abandon areas that have become dusty and cut up.

123. Bunks. Place a number of small poles about seven feet long close together, the upper ends resting on a cross pole about six

inches in diameter and the lower ends resting on the ground; or, the poles may be raised entirely off the ground by being placed on cross poles supported by forked stakes at the corners; on the poles place grass, leaves, etc.

124. Wood. The firewood should be collected, cut and piled near the kitchen. Dry wood is usually found under logs or roots of trees.

If wagons are not heavily loaded it is sometimes a good plan to bring a few sticks of dry wood from the preceding camp, or to pick up good wood en route.

125. Water. Precautionary measures should always be taken to prevent the contamination of the water, and a guard from the first troops reaching camp should at once be placed over the water supply.

If the water is obtained from a stream, places should be designated as follows for getting water:

- (1) For drinking and cooking;
- (2) For watering animals;
- (3) For bathing and for washing clothing.

The first designated place should be farthest up the stream; the others, in the order named, downstream.

Where two bodies of troops are to camp on the same stream one must not pollute the water to be used by the other. This can be arranged by the commanders agreeing upon a point where both commands will obtain their drinking water, upon a second point where animals will be watered, etc.

If the stream be small, the water supply may be increased by building a dam.

Small springs may be dug out and each lined with a gabion, or a barrel or box with both ends removed, or with stones, the space between the lining and the earth being filled with puddled clay. A rim of clay should be built to keep out surface drainage. The same method may be used near swamps, streams, or lakes to increase or clarify the water supply.

Water that is not known to be pure should be boiled 20 minutes; it should then be cooled and aerated by being poured repeatedly from one clean container to another, or it may be purified by apparatus supplied for the purpose.

Arrangements should be made for men to draw water from the authorized receptacles by means of a spigot or other similar arrange-

ment. The dipping of water from the receptacles, or the use of a common drinking cup, should be prohibited.

In the field it is sometimes necessary to sterilize or filter water. The easiest and surest way of sterilizing water is by boiling. Boiled water should be aerated by being poured from one receptacle to another or by being filtered through charcoal or clean gravel. Unless boiled water be thus aerated it is very unpalatable and it is with difficulty that troops can be made to drink it.

Filtration merely clarifies—it does not purify. The following are simple methods of filtration:

1. Dig a hole near the source of supply so that the water may percolate through the soil before being used.

2. Sink a barrel or box into the ground, the water entering therein through a wooden trough packed with clean sand, gravel or charcoal.

3. Place a box or barrel in another box or barrel of larger size, filling the space between with clean sand, gravel, moss or charcoal, and piercing holes near the bottom of the outer barrel and near the top of the inner. The filter thus constructed is partly submerged in the water to be filtered.

4. Bore a small hole in the bottom of a barrel or other suitable receptacle, which is partly filled with layers of sand, gravel, and, if available, charcoal and moss. The water is poured in at the top and is collected as it emerges from the aperture below.

The amount of water used by troops is usually computed at the rate of five gallons for each man and ten gallons for each animal per day.

126. Rules of sanitation. The following rules of sanitation are to be observed:

Men should not lie on damp ground. In temporary camps and in bivouac they raise their beds if suitable material, such as straw, leaves, or boughs can be obtained, or use their ponchos or slickers. In cold weather and when fuel is plentiful the ground may be warmed by fires, the men making their beds after raking away the ashes.

When troops are to remain in camp for some time all underbrush is cleared away and the camp made as comfortable as possible. Watering troughs, shelter in cold weather, and shade in hot, are provided for the animals, if practicable.

The camp is policed daily after breakfast and all refuse matter burned.

Tent walls are raised and the bedding and clothing aired daily, weather permitting.

Tents must be kept clean and in order.

The company street and the ground around the tents must be kept clean.

Food, slop water, rags, paper, empty tin cans, and other trash and refuse must not be thrown on the ground, but should be put in the box, can or other receptacle provided for the purpose or thrown into the incinerator.

The food must be protected from flies, dust and sun.

Under no circumstances must the company street or any other part of the camp grounds be defiled by urinating or defecating thereon. The urinal tub and the latrine must invariably be used.

When an open trench is used as a sink, each individual must always cover his excrement with dirt.

If the sink is inclosed by a box with stool-covers, the covers must always be put down as soon as one is through using them so as to keep out the flies. However it is found in practice that men will not do this therefore it is a good plan to construct the covers so that they will close automatically when a man rises from the seat.

Kitchen garbage must be burned in a pit or incinerator, or put into *covered* cans and hauled away. *The covers must be kept on the cans at all times*, so as to keep out the flies.

Horses are not to be ridden through camp except on the roadways. As soon as a tent is pitched it should be ditched.

When it rains the guy ropes must be loosened to prevent the tent pegs from pulling out and the tent falling down.

The body and the clothes should be cleaned daily as thoroughly as the means at hand will permit.

In the morning wash the face and neck and don't fail to use your tooth brush afterward.

In the continued absence of opportunity for bathing it is well to take an air bath and a moist or dry rub before getting into fresh underclothes.

If the lack of opportunity to wash clothes continues for any length of time, soiled clothes and bedding must be frequently exposed to the sun and air. Sunshine is a good germ killer.

If there are mosquitoes in camp, mosquito bars must be used by men when asleep, and headnets by men on guard and other duty. Also, if in a malarial country, about five grains of quinine should be taken daily, preferably just before supper. In localities where a

pernicious form of malaria prevails, daily doses of ten grains of quinine should be given.

In the tropics troops are required to camp at least 500 yards away from all native huts or villages as a preventative measure against malaria. Men are also prohibited from visiting these places at night for the same reason.

Clean your mess kit thoroughly after every meal, if practicable, washing same with soap and boiling water.

The company cooks must keep everything in the kitchen and mess tent clean with hot water and soap. Boil the utensils and dish rags, and be sure to throw all slops and garbage into the kitchen incinerator.

Rest and sleep are most important to preserve the health, so, keep the body rested by plenty of sleep. Do not join idle parties going to walk the streets of the nearest town at nights, nor sit up late playing cards.

Observe in camp even with greater care than when in barracks the rules of health and personal hygiene.

127. Your camp, your home. A soldier should always look upon his camp as his home, which it is for the time being. Your tent is your bedroom; the company street, your sitting-room; the latrine, your toilet; the mess tent, your dining-room; the camp kitchen, your kitchen; the bathing facilities, your bathroom. And as you are careful about keeping your bedroom and the other rooms of your home in a clean and orderly condition, so should you do your share to keep your tent and the other parts of camp in a clean, sanitary condition.

CHAPTER X

CONDUCT OF TROOPS IN THE FIELD

128. General. The conduct of troops in the field, and respect for property rights, are matters of such importance that they are made the subjects of two Articles of War,—the 89th and the 105th.

129. Good order to be maintained and wrongs redressed. All persons subject to military law are to behave themselves orderly in quarters, garrison, camp, and on the march; and any person subject to military law who commits any waste or spoil, or willfully destroys any property whatsoever (unless by order of his commanding officer), or commits any kind of depredation or riot, shall be punished as a court-martial may direct. Any commanding officer who, upon complaint made to him, refuses or omits to see reparation made to the party injured, in so far as the offender's pay shall go toward such reparation, as provided for in article one hundred and five, shall be dismissed from the service, or otherwise punished, as a court-martial may direct. (89th Article of War.)

130. Redress for injury to property. Whenever complaint is made to any commanding officer that damage has been done to the property of any person or that his property has been wrongfully taken by persons subject to military law, such complaint shall be investigated by a board consisting of any number of officers from one to three, which board shall be convened by the commanding officer and shall have, for the purpose of such investigation, power to summon witnesses and examine them upon oath or affirmation, to receive depositions or other documentary evidence, and to assess the damages sustained against the responsible parties. The assessment of damages made by such board shall be subject to the approval of the commanding officer, and in the amount approved by him shall be stopped against the pay of the offenders. And the order of such commanding officer directing stoppages herein authorized shall be conclusive on any disbursing officer for the payment by him to the injured parties of the stoppages so ordered.

Where the offenders can not be ascertained, but the organization or detachment to which they belong is known, stoppages to the

amount of damages inflicted may be made and assessed in such proportion as may be deemed just upon the individual members thereof who are shown to have been present with such organization or detachment at the time the damages complained of were inflicted as determined by the approved findings of the board. (105th Article of War.)

131. General Pershing's order governing conduct of troops in France. Apropos of the treatment of the subject of the conduct of troops in general, especially when in the field, it is considered in every way appropriate at this time (July, 1917) to reproduce in this book the following order issued by General Pershing, governing the conduct of our troops in France:

"For the first time in history an American army is in Europe. The good name of the United States and the maintenance of cordial relations require the perfect deportment of each member thereof. It is of the gravest importance at all times to treat respectfully the French people, especially women, who should be shown the greatest courtesy and consideration.

"The valiant deeds of the French armies and their allies in successfully maintaining a common cause for three years of war and the sacrifices of the civil population to support the armies command profound respect, which can best be expressed by uniform courtesy to all the French people and faithful observance of the laws and customs of the country.

"The intense cultivation of the soil under the conditions of war make necessary the exercise of extreme care so as not to damage private property. The entire French manhood capable of bearing arms is on the field fighting the enemy. It should therefore be a point of honor to avoid damage to any property in France. Such conduct is most reprehensible. We must honor them as in our own country."

CHAPTER XI

INDIVIDUAL COOKING

132. Importance of individual cooking. It often happens in campaign that it is impossible to have the field ranges and cooking utensils accompany the troops, and in such case each man must cook his own food in his mess kit. Also, it frequently happens that detachments operating away from their companies must do individual cooking.

All food we eat should be properly cooked, if not, stomach or intestinal trouble will result. Hence, the importance of every soldier learning how to cook in his mess kit the main components of the ration.

133. Fire. Remember that the best fire for cooking is a small, clear one, or better yet, a few brisk coals. Dig a hole in the ground with your bayonet and make your fire in it with dry wood, starting it with paper, shavings, dry leaves or dry grass.

If preferred the fire may be made between two small flat stones or bricks, care being taken to so place the stones that the draft will pass between them. The mess pan can be placed on the stones, across the fire, and the cup for boiling the coffee at the end away from the draft where it will get the most heat.

This method will, as a rule, be necessary on rocky or stony ground.

134. Recipes. The following recipes, which are based on the War Department publication, "Manual for Army Cooks," require the use of only the soldier's mess kit,—knife, fork, spoon, cup, and mess pan:

Meats

135. Bacon. Cut side of bacon in half lengthwise. Then cut slices about five to the inch, three of which should generally be sufficient for one man for one meal. Place in a mess pan with about one-half inch of cold water. Let come to a boil and then pour the water off. Fry over a brisk fire, turning the bacon once and quickly browning it. Remove the bacon to lid of mess pan, leaving the grease for frying potatoes, onions, rice flapjacks, etc., according to recipe.

136. Fresh meat. *To fry.*—To fry, a small amount of grease (1 to 2 spoonfuls) is necessary. Put grease in mess pan and let come to a smoking temperature, then dry in the steak and, if about one-half inch thick, let fry for about one minute before turning—depending upon whether it is desired it shall be rare, medium, or well done. Then turn and fry briskly as before. Salt and pepper to taste.

Applies to beef, veal, pork, mutton, venison, etc.

137. Fresh meat. *To broil.*—Cut in slices about 1 inch thick, from half as large as the hand to four times that size. Sharpen a stick or branch of convenient length, say from 2 to 4 feet long, and weave the point of the stick through the steak several times so that it may be readily turned over a few brisk coals or on the windward side of a small fire. Allow to brown nicely, turning frequently. Salt and pepper to taste. Meat with considerable fat is preferred, though any meat may be broiled in this manner.

138. Fresh meat. *To stew.*—Cut into chunks from one-half inch to 1 inch cubes. Fill cup about one-third full of meat and cover with about 1 inch of water. Let boil or simmer about one hour or until tender. Add such fibrous vegetables as carrots, turnips, or cabbage, cut into small chunks, soon after the meat is put on to boil, and potatoes, onions, or other tender vegetables when the meat is about half done. Amount of vegetables to be added, about the same as meat, depending upon supply and taste. Salt and pepper to taste. Applies to all fresh meats and fowls. The proportion of meat and vegetables used varies with their abundance and fixed quantities can not be adhered to. Fresh fish can be handled as above, except that it is cooked much quicker, and potatoes, onions, and canned corn are the only vegetables generally used with it, thus making a chowder. A slice of bacon would greatly improve the flavor. May be conveniently cooked in mess pan or tin cup.

Fresh Vegetables

139. Potatoes, fried. Take two medium-sized potatoes or one large one (about one-half pound), peel and cut into slices about one-fourth inch thick and scatter well in the mess pan in which the grease remains after frying the bacon. Add sufficient water to half cover the potatoes, cover with the lid to keep the moisture in, and let come to a boil from fifteen to twenty minutes. Remove the cover and dry as desired. Salt and pepper to taste. During the cooking the bacon already prepared may be kept on the cover, which is most conveniently placed bottom side up over the cooking vegetables.

140. Onions, fried. Same as potatoes.

141. Potatoes, boiled. Peel two medium-sized potatoes or one large one (about one-half pound), and cut in coarse chunks of about the same size—say 1½-inch cubes. Place in mess pan and three-fourths fill with water. Cover with lid and let boil or simmer for fifteen or twenty minutes. They are done when easily penetrated with a sharp stick. Pour off the water and let dry out for one or two minutes over hot ashes or light coals.

142. Potatoes, baked. Take two medium-sized potatoes or one large one cut in half (about one-half pound.) Lay in a bed of light coals, cover with same and smother with ashes. Do not disturb for thirty or forty minutes, when they should be done.

143. Rice. Take two-thirds of a cup of water and bring to a boil. Add 4 spoonfuls of rice and boil until soft, that is, until it can be mashed by the fingers with but little resistance. This will require about 15 minutes. Add 2 pinches of salt and, after stirring, pour off the water and empty the rice out on the lid of the mess pan.

144. Canned Tomatoes. One 2-pound can is generally sufficient for five men.

Stew. Pour into the mess pan one man's allowance of tomatoes, add about two large hardtacks broken into small pieces, and let come to a boil. Add salt and pepper to taste, or add a pinch of salt and one-fourth spoonful of sugar.

Or, having fried bacon, pour the tomatoes into the mess pan, the grease remaining, and add, if desired, two broken hardtacks. Set over a brisk fire and let come to a boil.

Or, heat the tomatoes just as they come from the can, adding two pinches of salt and one-half spoonful of sugar if desired.

Or, especially in hot weather, eaten cold with hard bread they are very palatable.

Hot Breads

145. Flapjack. Take 6 spoonfuls of flour and one-third spoonful of baking powder and mix thoroughly (or dry mix in a large pan before issue, at the rate of 25 pounds of flour and three half-pound cans of baking powder for 100 men). Add sufficient cold water to make a batter that will drip freely from the spoon, adding a pinch of salt. Pour into the mess pan, which should contain the grease from fried bacon, or a spoonful of butter or fat, and place over medium hot coals sufficient to bake so that in from five to seven minutes the flapjack may be turned over by a quick toss of the pan.

Fry from five to seven minutes longer or until, by examination, it is found to be done.

146. Hoecake. Hoecake is made exactly the same as a flapjack by substituting *corn meal* for *flour*.

Drinks

147. Coffee. Fill cup about two-thirds full of water and when it boils add 1 heaping spoonful of coffee, and let boil 5 minutes. Stir grains well when adding. Add 1 spoonful of sugar, if desired. Let simmer ten minutes after boiling. Settle with a dash of cold water or let stand for a few minutes.

148. Tea. Fill cup about two-thirds full of water and when it boils add $\frac{1}{2}$ spoonful of tea, and let boil 5 minutes. Add 1 spoonful of sugar, if desired. Let stand or "draw" 8 minutes. If allowed to stand longer, the tea will get bitter, unless separated from the grounds.

149. Cocoa. Fill cup about two-thirds full of water and when it boils add 1 heaping spoonful of cocoa and let boil 5 minutes. Stir when adding until dissolved. Add $1\frac{1}{2}$ spoonful of sugar, if desired. Let cool. (If available, milk should be used instead of water, and should be kept somewhat below the boiling point. A 1-pound can of evaporated milk with $3\frac{1}{2}$ quarts of water will make 1 gallon of milk of the proper consistency for making cocoa or chocolate.)

150. Chocolate. Same as cocoa, using 1 cubic inch of chocolate.

Emergency Ration

151. Emergency Rations. Detailed instructions as to the manner of preparing the emergency ration are found on the label with each can. Remember that even a very limited amount of bacon or hard bread, or both, taken with the emergency ration makes it far more palatable, and greatly extends the period during which it can be consumed with relish. For this reason it would be better to husband the supply of hard bread and bacon to use with the emergency ration when it becomes evident that the latter must be consumed, rather than to retain the emergency ration to the last extremity to be used exclusively for a longer period than two or three days.

CHAPTER XII

FIELD COOKING¹

152. Suspension of savings privilege. The regulations require that on the march, in concentration or maneuver camp, or in the field, the savings privilege be suspended and the troops subsisted on the ration in kind. It is also provided that the commanding officer will designate the ration to be issued to the troops, but that it shall not exceed the amount of any component authorized in garrison.

153. Prevention of waste. To prevent waste there must be even closer supervision in camp than in garrison, especially when the individual mess kit is used. Each man is served from the issuing table and the general tendency is to issue too freely, the men taking away more than they will eat. The food left on the mess kit is wasted. The mess sergeant should closely supervise this issue and insist that the cooks and the dining-room orderly use care and judgment when serving. Through close observation the mess sergeant and the cooks may learn the proper portions for each individual.

154. In permanent camp. The conveniences of a long-established camp gradually approach those of garrison, and where careful supervision is exercised, troops fare well. The savings privilege is often granted by special authority of the War Department to troops serving in permanent camp. Fresh beef may be supplied regularly and the bills of fare are much the same as in garrison. The dining-room arrangements are more simple and the kitchen work is greatly reduced because each man looks after his own individual mess kit.

With the improvised bake ovens mentioned herein, plenty of rolls, buns, and biscuits can be baked.

Flies are a pest in warm weather and in all camps of the least degree of permanence, the kitchen and dining-room should be screened. When this is not feasible, a screened cage may be made in which to keep the food. Coal oil should be freely used about the refuse cans to keep away flies and destroy their larva. The field expedients mentioned later are especially useful in permanent camp.

¹ From Manual for Army Cooks (1916).

155. In temporary camp. In a temporary camp—of from 5 to 10 days—the cooking is very much the same as in permanent camp. Meals are served to the men in the same manner and the same care must be exercised in the prevention of waste. In hot or wet weather a fly should be stretched over the range and the rations carefully protected. Frequently the escort wagon in which the rations are carried may be used for the storage of mess supplies, and a tent fly should then be put up for the protection of the cooks and food before issue. When possible a wall tent and fly should be used in place of the arrangement just indicated.

Though not absolutely necessary where the range is supplied, an excavation should be made in windy weather for the protection of the fire when an open grate is used. A pit 1 foot deep, with the additional protection afforded by the earth thrown upon the sides, will be ample.

156. On the march. The savings privilege is suspended and the ration is designated by the commanding officer. The regulations require the issues to be made daily. The table given in paragraph 197, showing the quantities of the component and substitutive articles allowed from 1 to 1,000 rations, will prove invaluable.

The quartermaster of the troops should, if practicable, arrange in advance for the supply of fresh meat and bread along the route. If it can not be done, such quantity of fresh meat, dependent upon the weather, as can be carried without danger of spoiling, should be taken along.

Several days' supply of fresh bread may be carried under favorable conditions. A field bakery unit and personnel may be attached to a command the size of a regiment.

The above measures insure the two most important components of the ration for a few days, but bacon, canned meats, hard bread, and dried vegetables must be used on the march almost to the exclusion of these more bulky components. Dried vegetables and canned goods are convenient on account of their small bulk and the ease with which they can be transported.

There is little time in the morning to prepare breakfast and no attempt should be made to have a great variety. A few components, good and substantial, including plenty of coffee, are about as much as can be provided. Upon arrival in camp it is necessary to get a quick meal, as the men are usually tired and hungry. The idea is to have something prepared quickly as a lunch. A fire should be started at once to heat water for coffee, which, with some form of canned

meat and bread, is sufficient. Then, while the company is making camp the cooks have ample time to prepare the main meal of the day, which is usually served in the late afternoon.

The following bill of fare is suggested as an example of what might be prepared for one day on the march:

BREAKFAST

Fried bacon or beefsteak, boiled potatoes, bread, and coffee.

LUNCH ON ARRIVAL IN CAMP

Canned corned beef or fried bacon or canned salmon, cold canned tomatoes, hard or fresh bread, and coffee.

DINNER

Soup, boiled or roast beef, or other boiled or roasted meat, mashed potatoes, peas, corn or succotash, bread, and coffee.

The improvised fireless cooker described in this chapter has been used to advantage on the march.

157. In campaign. Troops subsist on the field ration. This ration is prescribed in orders by the commander of the field forces, and consists of the reserve ration in whole or in part supplemented by articles of food procured locally or brought from the rear. It is contemplated that sufficient articles of food will be added to make this reserve ration equal the garrison ration, when practicable.

The arrangements for messing are dependent upon conditions and subject to many changes. These may approximate the arrangements in permanent camp or on the march where the company messes as a unit or the men may be required to cook individually, as when on patrol or in the presence of the enemy. It is best as a measure of economy and health to prepare the food for the organization as a whole rather than to issue it out to individuals or groups. Experience proves that the organization fares best when all members are present and the ration is handled by experienced men. This applies to the present field ration more than to any previously authorized.

The bills of fare will be simple and the mess sergeant and cooks are compelled to use their utmost ingenuity to provide a variety. It is considered impracticable to suggest a bill of fare for the field, because the ration varies at different times from the reserve to the full garrison ration.

Field Ranges

158. The Army field range No. 1, complete, as described herein weighs approximately 264 pounds with utensils, and with the addi-

tion of the Alamo attachment is designed to cook for 150 men. It consists essentially of two parts, viz.: the oven No. 41 and the boiling plate. The boiling plate has three sections, No. 42 and two other parts, forming the Alamo attachment No. 42A and 42B.

To pack the utensils and range for transportation, place the bake pan No. 52 on the ground. Set boiler No. 50 inside of bake pan No. 52; boiler No. 51 inside of boiler No. 50. Place tent guards inside of boiler No. 51 on bottom. Telescope the 4 joints of pipe. Inside of the pipe place 2 forks, 3 knives, 1 sharpener, 1 cleaver, and 2 folding lanterns. Place joints of pipe containing utensils inside of boiler No. 51. Place meat chopper in boiler No. 51 alongside of joints of pipe. Place 2 basting spoons, 1 meat saw, and 1 skimmer in boiler No. 51 on top of pipe. Cover with lid No. 51, then No. 50. Place bake pan No. 52 upside down over lid No. 50. Care should be taken that bake-pan handles are well down to sides of the pan. Nest 4 boilers Nos. 48, 49, 53, and 54, No. 48 outside. Place stove-pipe elbow in No. 54. Place dippers alongside of elbow. Place covers Nos. 54, 53, 49, and 48 on boilers in order named. Place nested boilers Nos. 48, 49, 53, and 54 in rear end of oven. Place bake pans and nested boilers in front end of oven. Close the oven door and lock with damper lock. Place 42A on left front corner of oven Nos. 41 and 42B on right front corner, inserting bar in crimp. This bar now rests against the pipe collar and prevents sliding. Place boiling plate No. 42 on top of range, eye fitting over stovepipe flange and engaging under the flat hook. Make secure by fastening hook on front of boiling plate to the lug on back of range. The range is now secure for transportation.

159. Installing the range. (See par. 167.) On the march the range is ordinarily set up by simply leveling the ground selected and placing the oven No. 41 and boiling plate No. 42 side by side, so that the oven door and fire-box door will be at the same end. Draw in 42A and 42B and secure bar-lock. Insert 42A into 42 and rest 42B snugly on the angle iron on the rear of the range. The oven should not be banked, as this would cause the sheet iron along the sides to warp and finally burn through. Sufficient earth, however, should be tamped along the sides and closed end to prevent the passage of gases beneath. This earth should not extend above the straps along the sides and under the oven door.

When used for one day only it will be unnecessary to dig a trench, but if a few shovelfuls of earth are removed from the place to be covered by the boiling plate it will facilitate firing. The best

results are obtained by using short wood—keeping the fire well toward the firing end of the boiling plate—or, if using long sticks and branches, pushing them under the boiling plate as they are consumed.

160. Trenching. If the range is to remain in place for several days, prepare trench as shown in par. 167.

When the range is set up on different ground daily no difficulty will be experienced in obtaining the proper temperature in the oven, both for top and bottom heat. Whenever it remains for a longer time than one day in the same spot, the ground will become dried out and hot, and it may be necessary to elevate the bake pans slightly above the floor of the oven, thereby leaving an air space under the pans. This can be done by the use of angle irons or other means. Never use earth or sand on the bottom of the oven chamber, for by so doing a hole will soon be burned in the bottom plate.

To install the range on a railroad car or on a wooden floor, see paragraph 316.

161. Brick fire box. The trench may be eliminated by installing the range on a brick wall about 8 inches thick and 3 bricks high. Set up the range temporarily and mark on the ground the outline of the oven, Alamo attachment, and boiling plate. Build the wall on the outline and on the line between the oven and boiling plate, the wall extending about 4 inches on each side of the outline, so that the base of the range will rest on the center of the wall. Then set up the range on the wall and fill up with earth or brick the space under the oven, except about 6 inches at the rear end. Bank the outside of the wall with earth.

In a permanent camp (see par. 168) it is frequently necessary to evaporate waste under the range and to consume the garbage by the same fire. In this case dig a pit about 4 feet long, 3½ feet wide, and 2 feet deep, to give a reservoir for waste water. Fill the pit with cobblestones, leaving a fire box and a gas chamber under boiling plate and Alamo attachment as suggested for temporary installation. Place a length of stovepipe or any kind of chute at a convenient place anywhere along the side of the oven, arranging the rocks on which it rests so that there will be a free passage for the water. Pour in the waste water as it accumulates, retaining all solid matter with a wire screen. The solid matter is burned in the trench under the boiling plate, a little at a time, after the meal has been prepared.

162. Reassembling for transportation. When reassembling for transportation, draw boiling plate No. 42 forward. Unfasten bar

lock, pull apart, and remove 42A and 42B and proceed as indicated above.

163. Remarks on handling the range. If properly installed, the oven will not be too hot on the bottom for ordinary baking, owing to the fact that the fire does not strike the range proper. A tin will be found inside the baking chamber, which may be used if for any reason the bottom of the oven is too hot. Should the bottom of the oven be too cold for efficient baking the tin should be removed. Articles brought to a boil on the boiling plate will continue to simmer if set on top of the oven or if placed alongside the oven. In this manner a dinner has been prepared for an entire battalion by adding the necessary utensils. A little care and judgment are necessary to secure satisfactory results.

Coal should never be used when wood is obtainable. If possible, even when coal is used, part of the fuel should be wood, for the use of coal alone will quickly destroy the range.

In permanent camp the space above and on the sides of the oven and the stovepipe should be cleaned at least once a week. This also applies to the boiling plates. The range, boiling plates, and pipes should be coated with a mixture of sugar and grease. This preservative prevents rust and gives a neat polished appearance to the range.

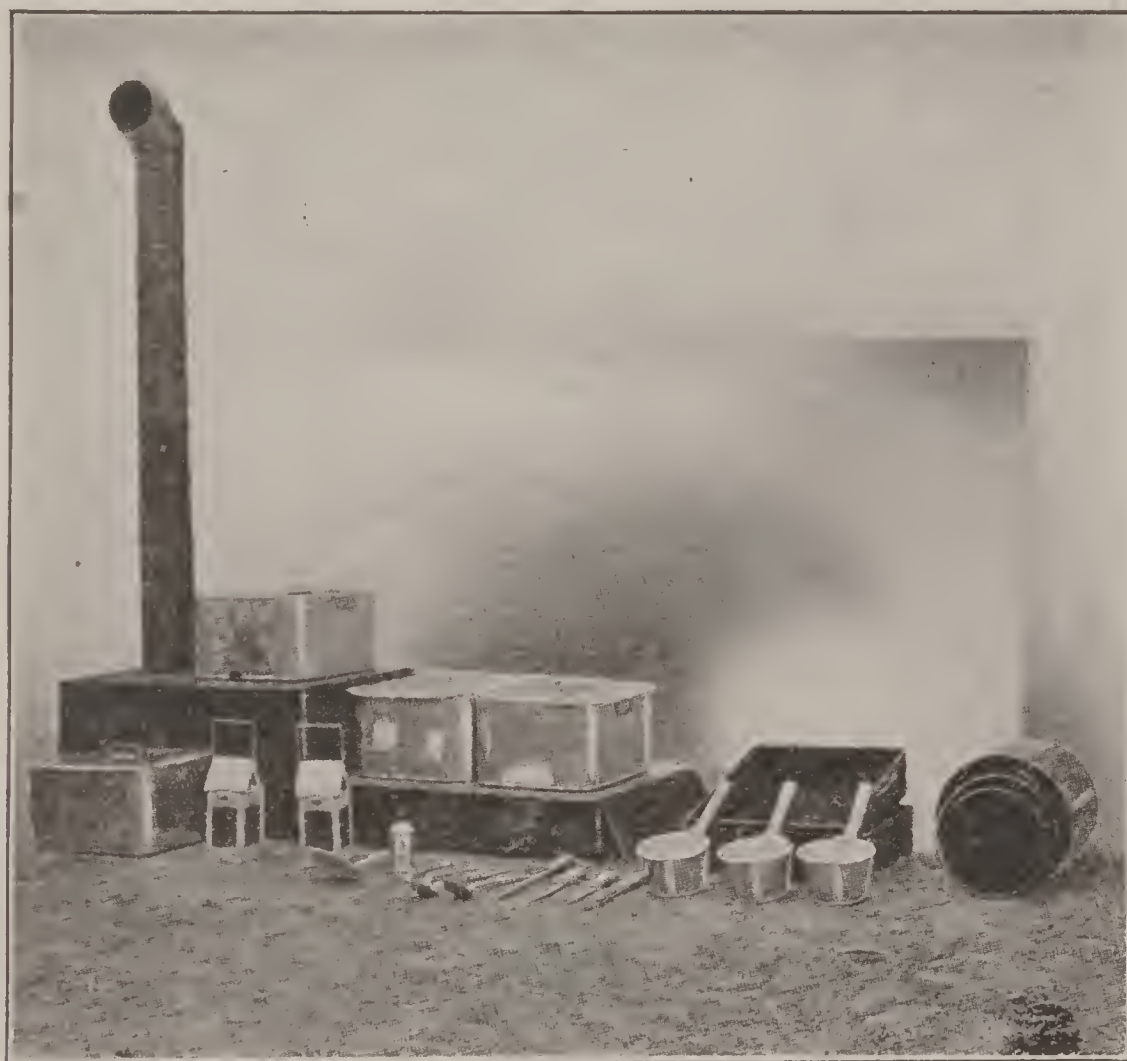
164. Army field range No. 2.—The Army field range No. 2, complete, weighs about 150 pounds with utensils and is designed to cook for 55 men. This range is without the Alamo attachment. It consists essentially of two parts—the oven, No. 61, and boiling plate, No. 62. For transportation the boiling plate is placed on top of the oven and the utensils (with flue) packed within the oven chamber.

This range is installed in accordance with the principles explained for army field range No. 1. It has no Alamo attachment and the boiling plate is attached, end to end, to the rear of the oven, the projecting collar of the boiling plate being slipped into the space cut from the rear end of the oven for that purpose. (See par. 166.) The trench is dug under the boiling plate and extends about three inches under the rear end of the oven.

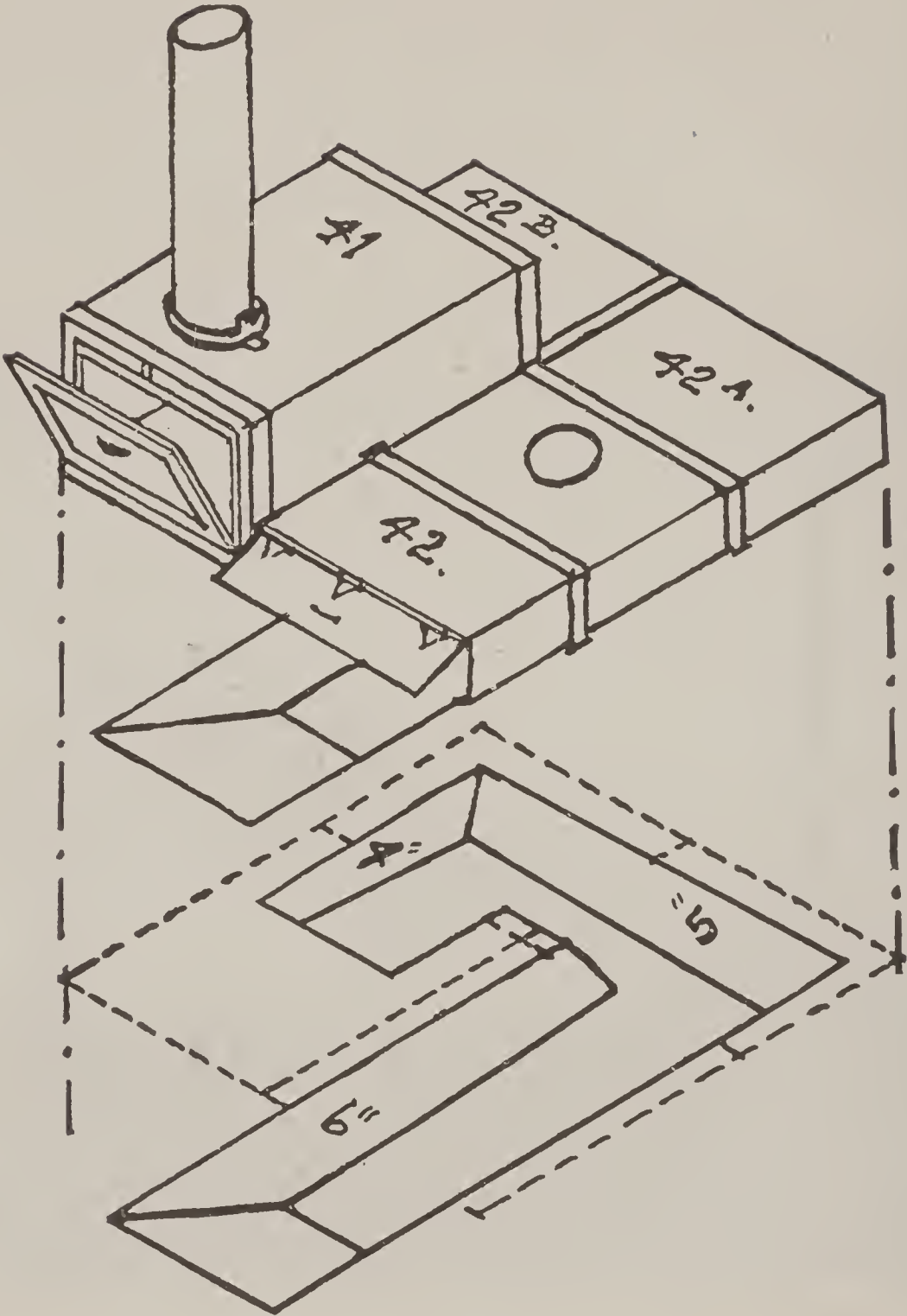
165. To pack utensils and range for transportation place bake pan No. 52 on the ground. Set boiler No. 50 inside of bake pan No. 52; boiler No. 51 inside of boiler No. 50. Place tent guards on bottom of boiler No. 51. Telescope the 4 joints of stovepipe. Inside of pipe place 2 forks, 2 knives, 1 sharpener, 2 spoons, 1 lantern (folding), and 1 skimmer. Place the joints of pipe containing uten-

sils in boiler No. 51. Place dipper and elbow alongside the pipe. Place meat saw in bake pan No. 52 alongside the boilers. Cover boilers with lids No. 51 and No. 50. Place bake pan No. 52 upside down over lid No. 50. Place pans in the range oven. Place the boiling plate at the door end of the oven. Engage the flanges on the inner side of boiling plate with the lugs on the door end of the oven. Fasten the hook on boiling plate (firing end) to lug above the handle on the closed end of oven. The range is now secure for transportation.

166. Army field range, without Alamo attachment.

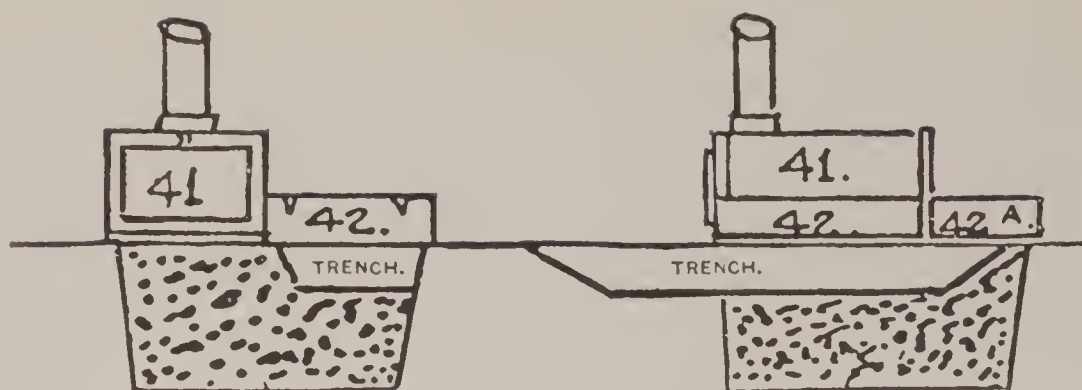


167. Army Field Range No. 1.



Upper figure shows Army field range No. 1 with Alamo attachment, assembled for use. In the lower figure, the solid lines show trenching for same and the dotted lines the trace of the base of the oven, boiling plate, and Alamo attachment.

168.



Army field range No. 1 with Alamo attachment, trench, and cobblestone pit (2 feet deep) for incineration of waste.

EQUIPMENT A

It consists of the following utensils:

- 1 cake turner.
- 1 can, water, G. I., large.
- 1 can, water, G. I., small.
- 1 cleaver, meat.
- 1 dipper, large.
- 1 fork, meat, large.
- 1 fire-iron set.
- 3 kettles and covers, camp.
- 1 knife, meat, large.
- 4 pans, bake.

This is the allowance under existing orders of cooking utensils where transportation is limited.

169. Fireless cookers. A fireless cooker is an air-tight receptacle for the slow preparation of partly cooked food by heat stored up in the food, or mechanically introduced as when soapstones are used. It is also used to preserve the temperature of food cooked or uncooked.

It is generally a box-like arrangement lined with a nonconducting material within which is the well or reservoir, into which the vessel containing the hot food is placed.

Many different makes of fireless cookers are found on the market, and various material such as asbestos, paper felt, hay, indurated fiber, etc., are used as nonconductors. In some types heated soapstones are placed in the well to keep the food at a cooking temperature for long periods, or to supply the heat ordinarily given to the food before it is placed in the cooker.

To cook food requires the application of a certain amount of heat at a temperature between 130° and 385° F. (in the case of fireless cookers, between 130° and 212°) though the lower the temperature the longer the process will be.

The object of a fireless cooker is simply to use the heat above 130° F. which has been stored in the food to finish cooking it.

The advantages are: The food may be served warm on the march or upon arrival in camp; it saves fuel; being a slow process it renders such food as tough meats tender and palatable; and the food, having been placed in the cooker, requires no further attention.

To prepare food for cooking in the fireless cooker the general idea is to place food on the range and when sufficient heat has been stored up in it, to transfer the food directly to the cooker where cooking will continue as long as the temperature remains above 130° F.

To get the best results, most articles of food to be cooked should be covered with liquid when put in the cooker. Such vegetables as potatoes, parsnips, etc., should be about half cooked, the water drained off, and then put into the cooker. The vegetable is then allowed to finish cooking with its retained heat, remaining in the cooker for a few hours only.

A considerable amount of acid is found in tomatoes, and dishes containing them should not be permitted to remain in the fireless cooker or other tin receptacles for longer than four or five hours. Coffee should be first prepared by boiling in a sack in the regular boiler so that the grounds need not be placed in the cooker.

The type of fireless cooker shown has proven as efficient as any on the market and more convenient for field service. Those on the market are too heavy and bulky for field use and are not popular in garrison.

Used as an improvised cooker, two of the water cans and two 10-gallon milk cans will provide one meal of coffee and hot beans or beef stew for 80 men. Eight of these cans will supply lunch for about 300 men and, when loaded on an escort wagon, leave sufficient room for rations and equipage.

The food can be prepared at the same time the cooks are preparing breakfast and placed in the cooker, which is loaded on the wagons, so as to be readily accessible when needed.

IMPROVISED FIRELESS COOKER



Most satisfactory fireless cooker yet devised, which is a milk can placed within a water or ash can with hay or straw packed in between. In camp the large cans are used for water and the small ones for cooking, so that no unnecessary impedimenta is carried.

170. Rolling kitchens. There are several types on the market. Most of them consist of ranges or boilers mounted on running gears of carts or wagons, so that the cooking may be done while the kitchen is in motion. Many are also provided with separate wells or compartments constructed on the principle of the fireless cooker, in which the food, already cooked, may be kept warm.

These rolling kitchens or soup wagons are a great convenience to troops on the march or on the firing line, but considering the amount of transportation and road space they require, it is doubtful if they should be used except under special conditions, as where troops are occupying a more or less stationary firing line.

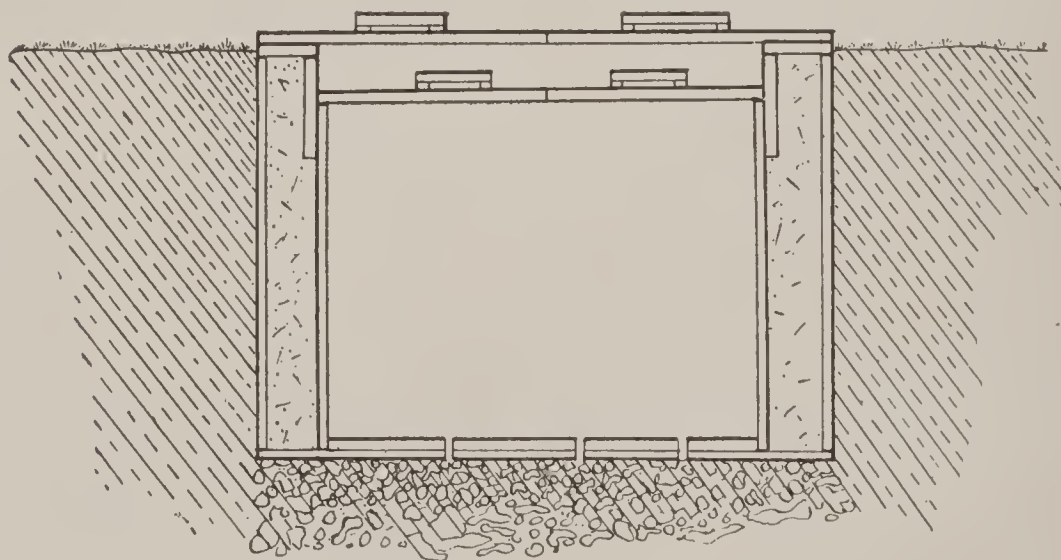
171. Field expedients. Equipment A is used when transportation is limited. With this equipment only boiling and frying can be done unless improvised ovens are constructed. In the absence of the fire irons provided with the equipment, narrow trenches of suitable width

or trunks of green trees or rocks may be arranged as convenient substitutes. When time is available an oven in a bank or a mud field range should be constructed. These should be provided with openings on top, over which boilers may be placed for cooking. With this type of oven the cooking may be done on the top and afterwards the coals withdrawn and baking done in the chamber, or they may be used for baking and roasting only and the boiling otherwise provided for. By the latter method all portions of the meal may be cooked at one time. Another device which may be used is a simple range which is made by covering a suitable trench with a bake pan or two for a boiling surface and utilizing two or more coffee cans set end on for a flue. Beans may be baked in dugout ovens, clay ovens, or a vertical hole dug in the ground into which a jar or camp kettle containing them is placed and packed over and around with hot coals and earth. Water may be kept cool without ice by using a canvas bag, or a can wrapped with wet burlap or grain sacks. They should be kept in a draft, if possible, so as to increase the evaporation.

The following are some of the simple expedients that may be used in the field.

172. Ice boxes. An ice box is often a great convenience and may be constructed by simply setting a dry-goods box inside of a larger

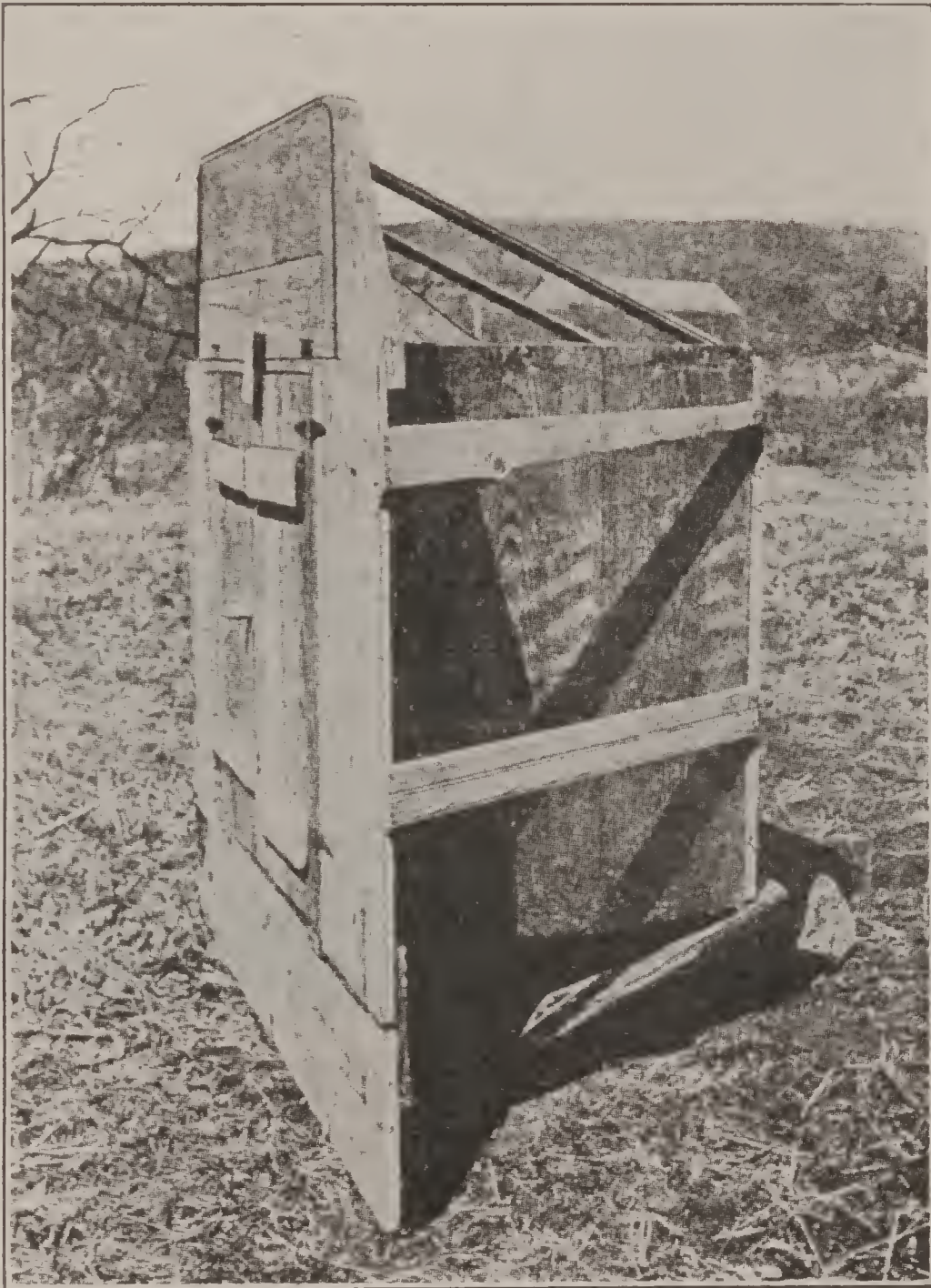
IMPROVISED ICE BOX



To provide a simple ice box for the field, sink a packing box of suitable size into the ground and prepare a close-fitting cover in two parts, for convenience in handling. It is well to surround the box with heavy paper or with packed straw or grass to prevent dirt from falling in through the cracks. To provide drainage, bore several holes in the bottom of the box, and, if practicable, put a quantity of stone or gravel in the bottom of the pit before installing the box. If facilities are at hand, provide a double box as shown. It will be more cleanly and, on account of the double top, the ice will last longer.

one, preparing the necessary lids, and filling the space between the two boxes—4 to 8 inches—with sawdust, gunny sacks, leaves, grass, hay, straw, etc. Or even better, a single box may be set in the ground and packed around with materials as noted above or with solid earth.

A very practical field ice box can be readily constructed according to the design below. It should be well banked with earth on the sides, rear and top, and should face south.



173. Incinerators. Improvised incinerators are essential in camp. They may be made in several forms, the simplest of which is a pit about 6 feet in diameter and about 3 feet deep in the center, sloping uniformly to the outer edge. This pit is filled with rock, on which the fire is built. The water is poured into the edge of the pit and seeps among the hot rocks, which cause it to evaporate. The solid matter and cans are thrown into the fire; the cans are raked out each morning. Although this is the most simple form of incinerator and the most easily constructed, it is the most expensive, because of the excessive amount of wood consumed.

The incinerator shown in paragraph 167 in combination with the Army field range No. 1 is the most convenient and economical for camps of a few days.

The following simple incinerator is recommended for a company in camps of longer duration.

COMPANY INCINERATOR



Dig two trenches 10 feet long and 10 or 12 inches wide, bisecting each other. At the point of bisection have the trenches 30 inches deep, gradually shallowing from this point to the ends. Fill with rock until about 18 inches deep at center. Over the place of bisection place four boards to support an ordinary sugar or flour barrel. Around the barrel pile sods of earth up to the top. Pack tightly. Make a fire in the trench under the barrel, which, upon being burned out, leaves a hard cone. According to the direction of the wind, leave one trench open and plug the other three openings near the cone with boards, turf, or loose soil. This gives a draft of air through the open trench and up through the cone, which acts as a flue.

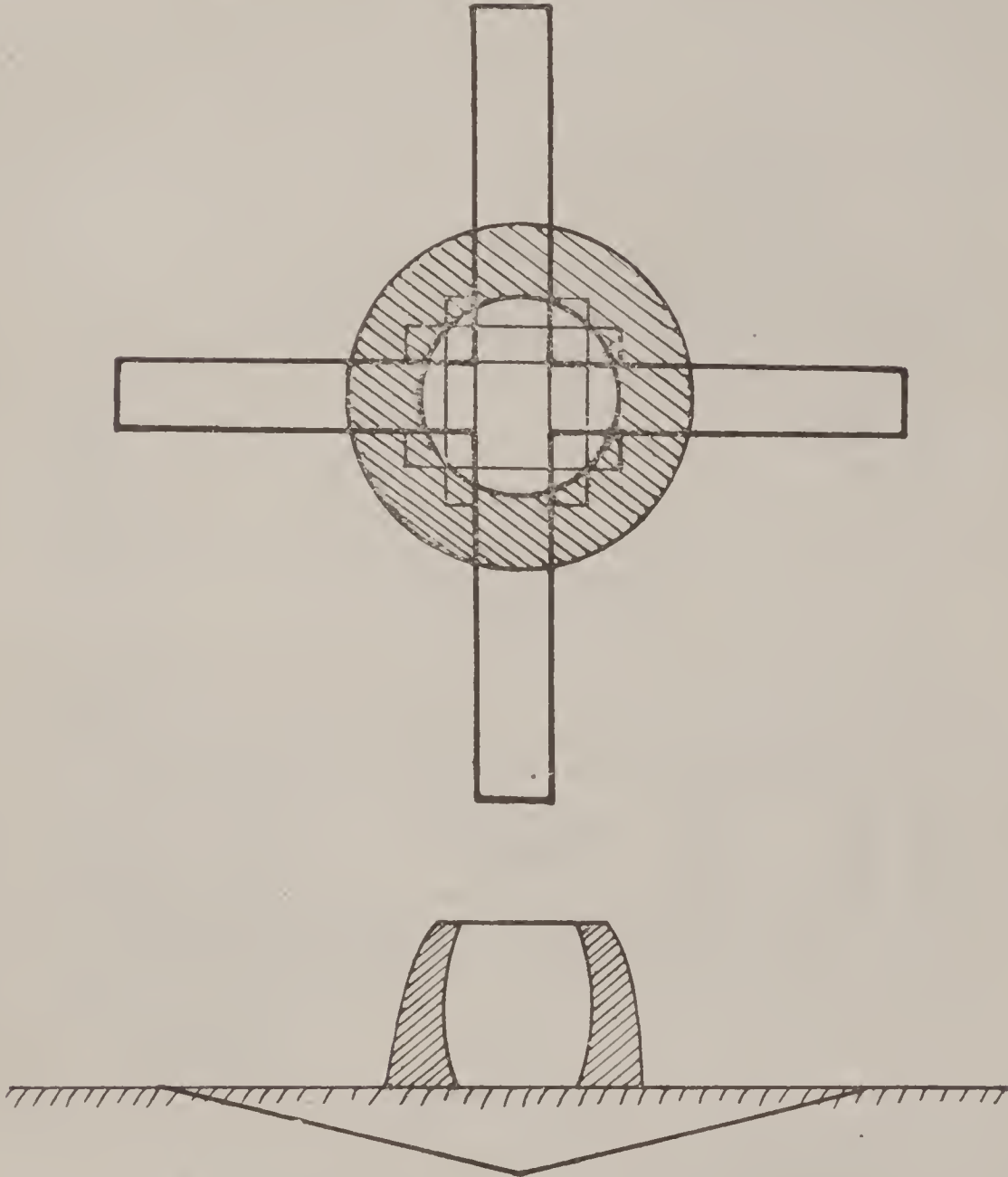
If the soil is full of clay, the cone is easily made. If not it can be done in the manner shown in the illustration by using sods.

All the garbage of a company kitchen in the field can be easily disposed of by this means.

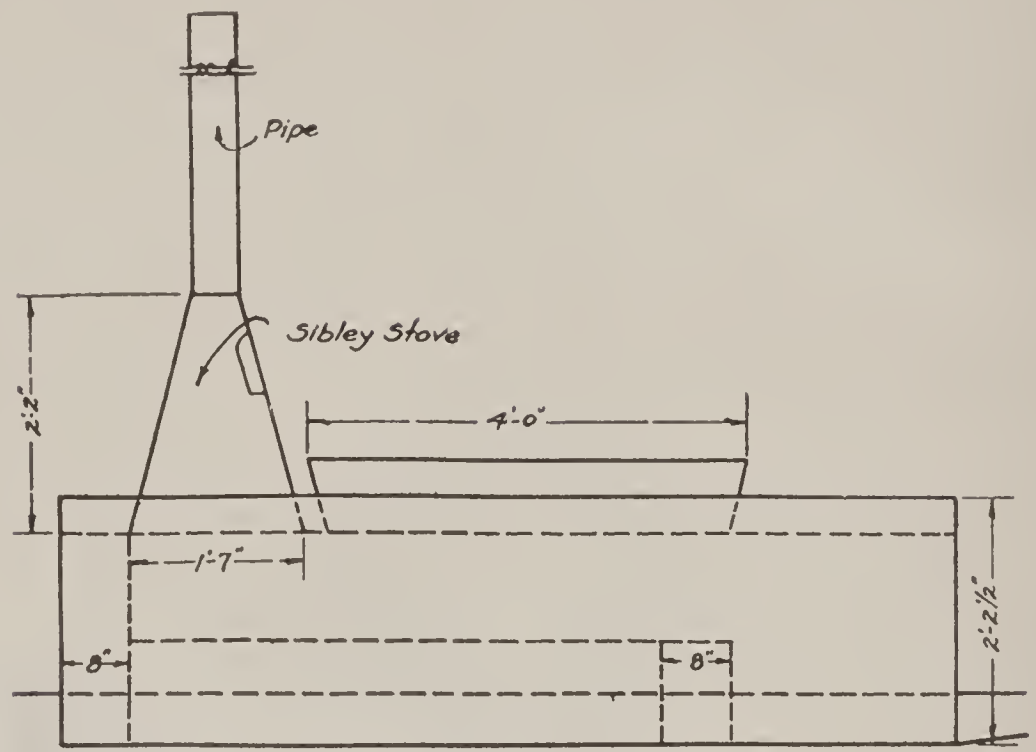
At the end of each day the ashes and tin cans should be raked out of the fireplace and a fresh fire started in the morning.

The fire is kept up by dropping fuel material down the cone, and garbage is fed to it in the same manner.

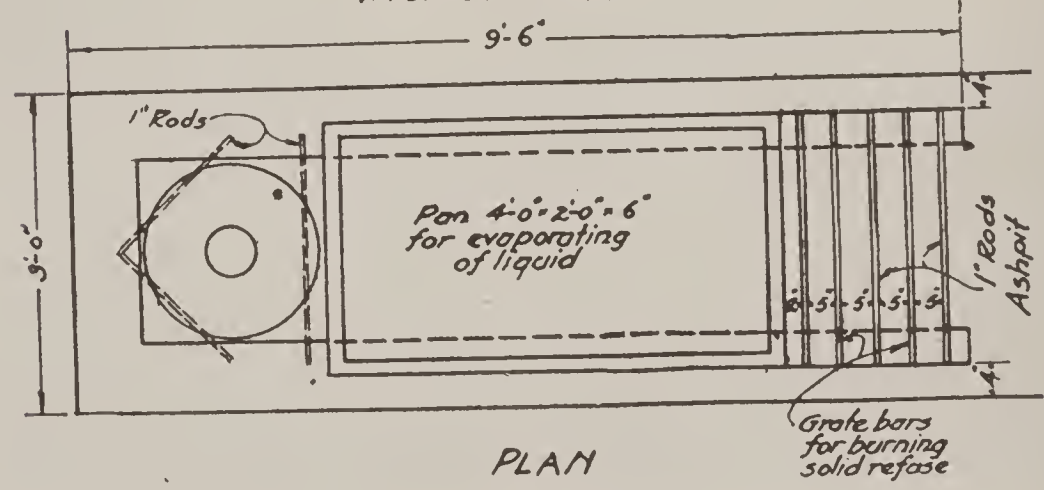
PLAN AND CROSS SECTION OF COMPANY INCINERATOR



In permanent camp a more elaborate incinerator may be readily constructed according to the following specifications:



SIDE ELEVATION
INCINERATOR



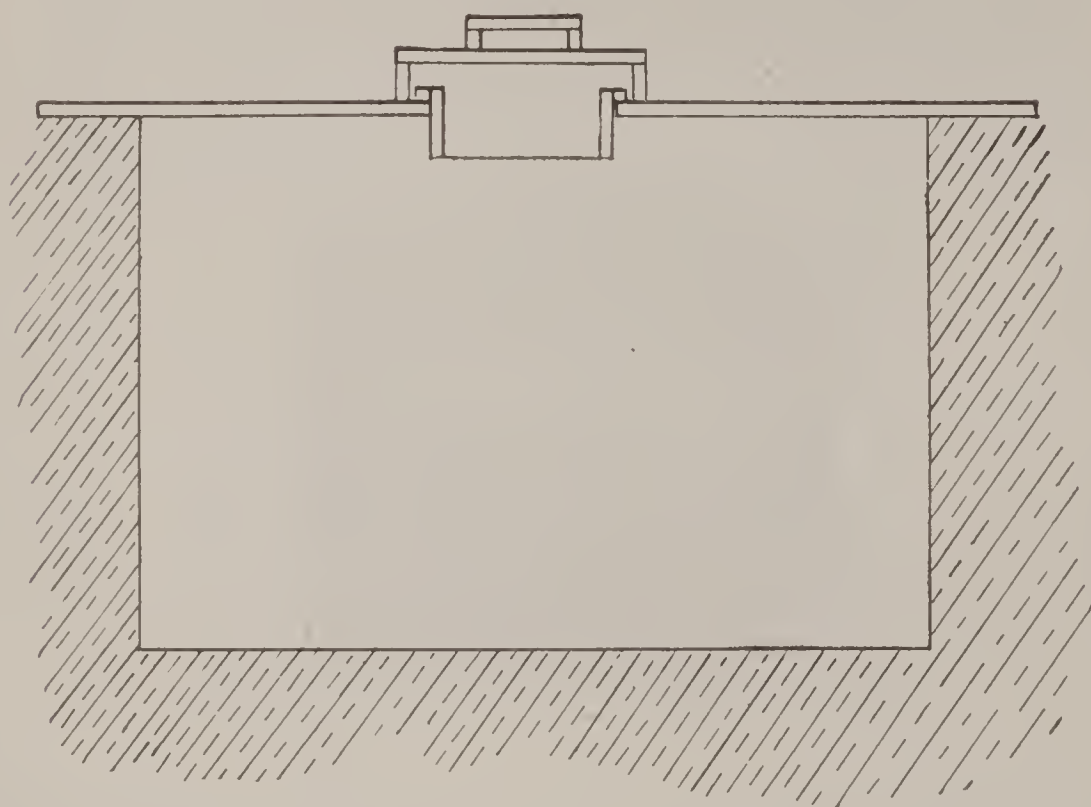
PLAN
INCINERATOR

- MATERIALS**
500 brick
1 G.I. pan 4'-0" x 2'-0" x 6"
1 Sibley stove
8 Grate Bars 24" x 1"

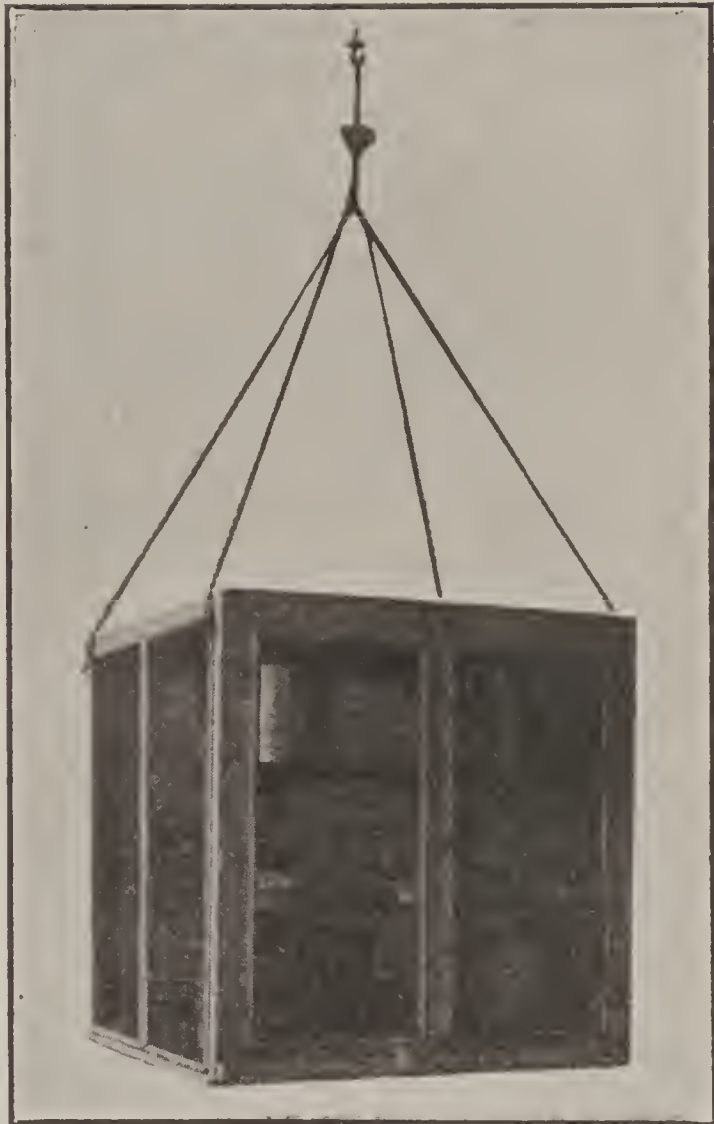
Estimated Cost \$200.00

174. Pit for slops. Whenever facilities are not provided for disposing of the kitchen waste, it becomes necessary to dig a pit. In short camps not likely to be used again all kitchen waste may be thrown into the pit, but in camps of longer duration it is necessary to strain all dish water, etc., through a box sieve suitably placed over the pit and then to burn all solid matter in the range or incinerator. To darken the pit and keep it free from flies, make a solid board top, tamp with dirt, and provide a detachable box sieve with cover, as shown. The pit should generally be about $2\frac{1}{2}$ feet wide, 5 feet long, and 4 feet deep when dug in clay. In more permeable soil the dimensions may be somewhat reduced. The incinerator is more satisfactory for disposing of waste water.

The following is a cross-section drawing of a slop pit:



175. Swinging cage. A swinging cage, such as the one shown in the following illustration, is especially useful in the tropics or in camp.



It should be suspended in such a manner that a cup of oil placed as shown will prevent insects from reaching the cage.

Dimensions, about 3 feet square and 3 feet high.

It is not regularly supplied and if provided must be constructed at the expense of the company fund.

176. Field ovens. The plate below illustrates the several varieties of improvised field ovens.

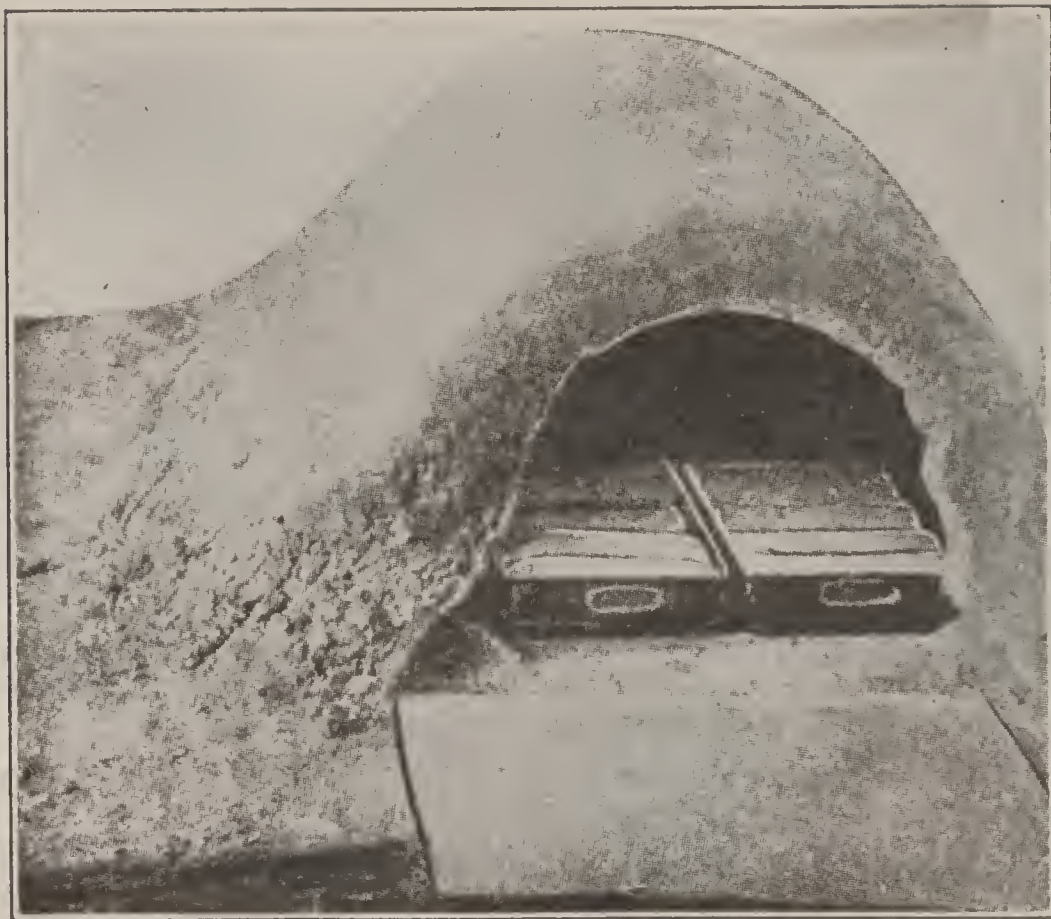


1. Clay covered trench. 2. Open trench for baking. 3. Bean pit. 4. Ovens in hillside. 5. Mud oven. 6. Mud range.

HOW TO CONSTRUCT AND OPERATE A TWO-BARREL CLAY OVEN

Select a piece of level ground about 4 feet by 10 feet; get two salt or sugar barrels; knock top and bottom from one, and a small section of the bottom from the other (to be used as a flue in burning out); place them together head on, the one with the bottom to the rear. Cover the ends coming together with a little hay, so as to keep the sand from falling in, and stuff up the hole broken in the bottom of the rear barrel. Get some moist sand and cover both barrels completely, molding it so that it will be about two inches thick on top and splay out at the bottom about 2 inches on each side. Then mix some clay with hay, straw, or grass until you have a pretty stiff mixture, and cover the sand, beginning at the bottom where it should be about 8 inches thick and finishing at the top with about 4 inches. Let stand for a day or two and then add about 3 inches of clay to the entire oven. Allow to stand a day longer and then cut a hole at the rear, taking the hay from the bottom

TWO-BARREL CLAY OVEN



of the barrel. This will afford a draught and is also an excellent means of regulating the heat. Put a fire in the barrels and burn them out. Care should be taken to put in just enough fire to start the barrels, as a big fire will burn it too quickly, and the oven will cave in. After the barrels are burned out, scrape all the sand from the top and sides and throw it out. The oven is now complete.

To obtain the best results with this type of oven, it is best to start the fire as soon as the dough is set. Keep up a pretty brisk fire for about two hours, and as soon as the dough is punched down, spread the coals evenly throughout the entire oven, and close all draughts. As soon as the dough is panned, draw the fire and close the oven up for about half an hour. Then take the oven "counts." If you can count seven (second count) you have just the proper heat. If more

OPEN TRENCH USED FOR BAKING



Trench about 6 feet by 15 inches by 12 inches deep. Dry out by slow fire and keep slow fire in it about 2 hours before baking. Sweep trench clean and test temperature by sprinkling a little flour on bottom. It should brown in about 2 minutes. Place loaves, molded dry, across trench and about 2 inches apart. Cover trench with a sheet of iron or zinc and place coals upon it. Regulate top heat as required. Vienna shaped single-ration loaves recommended.

than 10, the oven is useless. If less than seven, the oven is too hot. This oven will hold five pans, each 12 by 24 inches, or 50 rations—sufficient for a company—and is equal to baking properties to any oven made.

To make a second run, put in another fire for about half an hour, draw the fire and close the oven for 15 minutes, and the oven will be ready for the second run. It would be well to dig a trench in front of the oven for convenience in handling the bread.

Lay out a level piece of ground about 3 feet 10 inches by 6 feet 9 inches and cover about 3 inches thick with wet clay, pack well and smooth on top. On the center of this floor lay the barrels end to end with the opening of one where the front of the range is to be. Take sand just damp enough to mold and pack under the sides of the barrels and over the top, making the form for the inside of the oven. With the clay make a thick mud and mix straw into it. This is very necessary, as the straw holds the clay together.

Begin on the sides and back and lay on the mud by hand, packing it well as it is laid on. Make bottom of sides about 10 inches thick and top about eight inches.

THE MUD FIELD RANGE



4. Dug-Out Oven. 5. Two-Barrel Mud Oven. 6. Two-Barrel Mud Range.

Just before the top is laid on, place blocks or bricks on end in center of top of each barrel and one over where the barrels join. Pack some of the clay around them to hold them in place while finishing the top.

If desired, a hole may be left at the back, and a mud chimney constructed. This improves the draft and is believed desirable, but is not necessary.

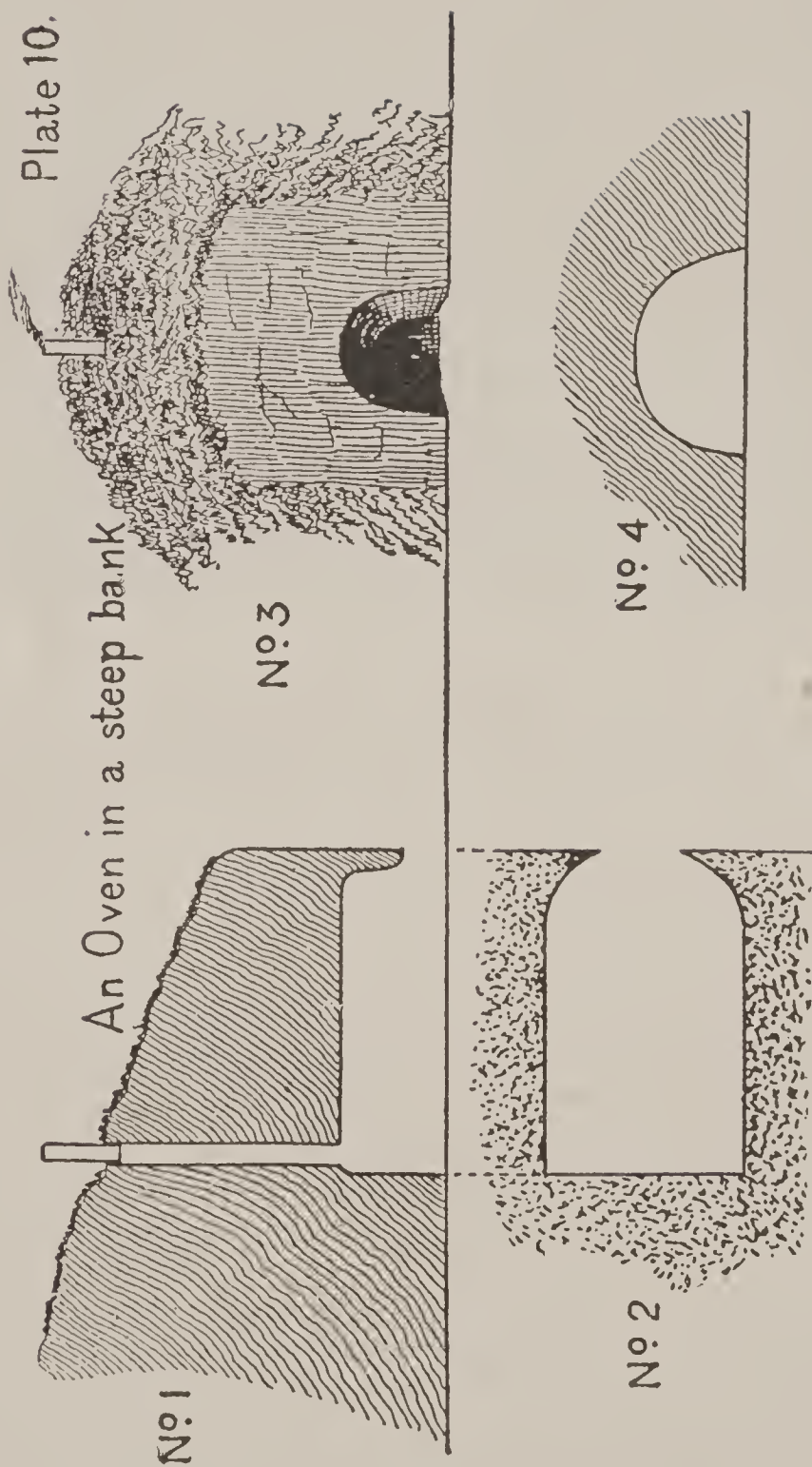
This oven should be allowed to stand in a dry atmosphere for at least 24 hours. Then burn out the barrels with a slow fire. Keep a slow fire burning until the oven is well dried. The sand will then drop out and can be raked out with a hoe. Remove the bricks or blocks and the range is ready for use, but cracks appearing should be plastered up with mud. *Time required for four men to build, about 4 hours.*

When articles cooked on top of the range are done, the fire can be drawn and the oven used for baking bread or meats. See figure 6 above.

This is recommended as a very good and convenient oven. A bank from 4 to 6 feet high is the best for the purpose. The roof covering need not exceed $1\frac{1}{2}$ feet. Two men with a spade and a long-

handled shovel can build it in light soil in three-quarters of an hour. If such tools are not available, it may be constructed with trowel, bayonet, intrenching tools, or even with knives. To build the oven, dig down the bank to a vertical face and excavate at the base a hole from 4 to 5 feet horizontally, care being taken to keep the entrance as small as possible; hollow out the sides of the excavation and arch the roof until the floor is about 2 feet 6 inches in its widest part and the roof 16 inches high in the center of the arch. Then tap the back end for the flue. A hole from 4 to 6 inches in diameter will furnish a good draft. A piece of tent stove pipe may be utilized for this purpose. When difficult of construction, the flue may be omitted, and practically as good results will be obtained. The time required for drying will depend upon the character of the soil. If ordinarily dry, a fire kept up for an hour will suffice.

After the oven has been heated the temperature may be regulated by means of the door and flue—opening or closing them as may be necessary.



0 1 2 3 4
SCALE OF FEET.

Handled in exactly the same manner as the improvised two-barrel clay oven.

CHAPTER XIII

MESSING ON RAILROAD TRAINS

ON RAILROAD TRAINS

177. Standard kitchen car. This is a remodeled tourist sleeper, designed to cook for a battalion (peace strength) and to carry 42 men. Only limited facilities are provided for cold storage and for the storage of nonperishable articles, so that the bulk of the food supplies must be carried in a baggage car. For this reason, arrangements should always be made to have a portion of a baggage car—from one-third to one-half—allotted for this purpose, and in making up the train this portion of the baggage car should be placed next to the kitchen. The garrison ration is issued, and a considerable saving should be made from the credit allowance on beef, beans, dried fruits, sugar, sirup, flavoring extracts, etc. With this saving canned meats, canned vegetables, and canned fruits may be purchased.

An officer is detailed by the commanding officer of the troops to take charge of the messing arrangements and he is assisted by a mess sergeant. The mess officer designates the hours for meals and the manner in which they are to be served and requests the necessary details for kitchen police and waiters. Generally one or two cooks are provided by the Pullman Co. and the company cooks should be detailed to render them the necessary assistance and to perform the duties of kitchen police.

For serving the meal, the company mess sergeant and one man for each article on the bill of fare should report from each company. The serving of the meal does not begin until everything is ready. The details are then called up in order and the quantities due each organization having been determined, the troops farthest from the kitchen are served first.

178. Bills of fare. The following bills of fare are considered appropriate:

Bills of fare for 100 men for 4 days

DINNER, 22D

Fried beef steak: 50 pounds steak.

Cream gravy: 2 pounds flour, 3 cans milk.

178 (contd.)

Boiled potatoes: 75 pounds potatoes.

Farina custard: 8 pounds farina, 24 eggs, 6 pounds sugar, 3 cans milk, 2 ounces extract.

SUPPER, 22D

Beef stew: 30 pounds beef, 50 pounds potatoes, 2 pounds onions, 2 pounds flour.

Creamed hominy: 20 pounds hominy, 3 cans milk.

Coffee.

BREAKFAST, 23D

Fried bacon: 25 pounds bacon.

Rolled oats and milk: 12 pounds rolled oats, 7 pounds sugar, 6 cans milk.

Apple jelly: 25 pounds jelly.

Butter: 2 pounds butter.

Coffee.

DINNER, 23D

Roast beef: 45 pounds beef.

Browned potatoes: 75 pounds potatoes.

Kidney beans: 15 pounds beans, kidney.

Brown gravy, 2 pounds flour.

SUPPER, 23D

Sliced cheese: 18 pounds cheese.

Creamed potatoes: 60 pounds potatoes, 3 cans milk, 2 pounds flour.

Stewed peaches: 25 pounds peaches, 8 pounds sugar.

Butter: 2 pounds butter.

Coffee.

BREAKFAST, 24TH

Beef stew: 30 pounds beef, 50 pounds potatoes, 2 pounds onions, 2 pounds flour.

Hot biscuit: 24 pounds flour, 24 ounces baking powder, 6 pounds grease, 10 ounces salt.

Sirup: 3 gallons sirup.

Butter: 2 pounds butter.

Coffee.

DINNER, 24TH

Hot frankfurters: 20 pounds frankfurters.

Mashed potatoes: 70 pounds potatoes.

Hot slaw: 25 pounds cabbage, 5 pounds bacon, 1 gallon vinegar, 2 pounds sugar.

Tapioca custard: 5 pounds tapioca, 6 pounds sugar, 24 eggs, 2 ounces extract, 3 cans milk.

SUPPER, 24TH

Baked beef hash: 30 pounds beef, 50 pounds potatoes, 5 pounds onions.

Stewed tomatoes: 20 cans tomatoes, 2 pounds sugar, 3 cans milk.

Butter: 2 pounds butter.

Coffee.

BREAKFAST, 25TH

Fried bacon: 25 pounds bacon.

Gravy: 2 pounds flour.

Fried potatoes: 75 pounds potatoes.

Butter: 2 pounds butter.

Coffee.

DINNER, 25TH

Beef pot roast: 50 pounds beef, 5 pounds onions, 2 cans tomatoes.

Brown gravy: 2 pounds flour.

Browned potatoes: 70 pounds potatoes.

Stewed corn: 18 cans corn, 3 cans milk.

Bread pudding: 20 pounds bread, 4 pounds raisins, 8 pounds sugar, 4 cans milk, 1 can cinnamon.

Vanilla sauce: 3 pounds sugar, 2 pounds cornstarch, 2 cans milk, 2 ounces extract.

SUPPER, 25TH

Beef, Spanish: 50 pounds beef, 5 pounds onions, 5 cans tomatoes, 3 pounds flour.

Mashed potatoes: 75 pounds potatoes.

Butter: 2 pounds butter.

Coffec.

BREAKFAST, 26TH

Beef stew: 30 pounds beef, 50 pounds potatoes, 2 pounds onions, 2 pounds flour.
Rolled oats and milk: 12 pounds oats, 7 pounds sugar, 6 cans milk.
Coffee.

179. Suggestions to mess sergeant.

- (1) Keep the keys to the ice box during journey.
- (2) Weigh out to cooks every article on this bill of fare in the exact amount specified.
- (3) If it becomes apparent that rations will have to be turned in at end of journey, change meals so as to have nonperishable articles left as far as possible.
- (4) If no scales are available, refer to table of weights and measures in individual cooking, Chapter VI, paragraphs 301 and 302.
- (5) Have sufficient water heated for the men to wash their dishes. Each car will send one man to the kitchen for same and dishes will be washed on car platform. Clean the platform when dishes are finished.
- (6) Use 30 pounds of bread to each meal.
- (7) Use $3\frac{1}{2}$ pounds coffee, 4 pounds sugar, 4 cans milk to each meal of coffee.

180. Baggage car with field range. When the standard kitchen car is not available, one or more Army field ranges may be set up in a baggage car. With this equipment the messing arrangements are similar to those when the standard kitchen cars are used.

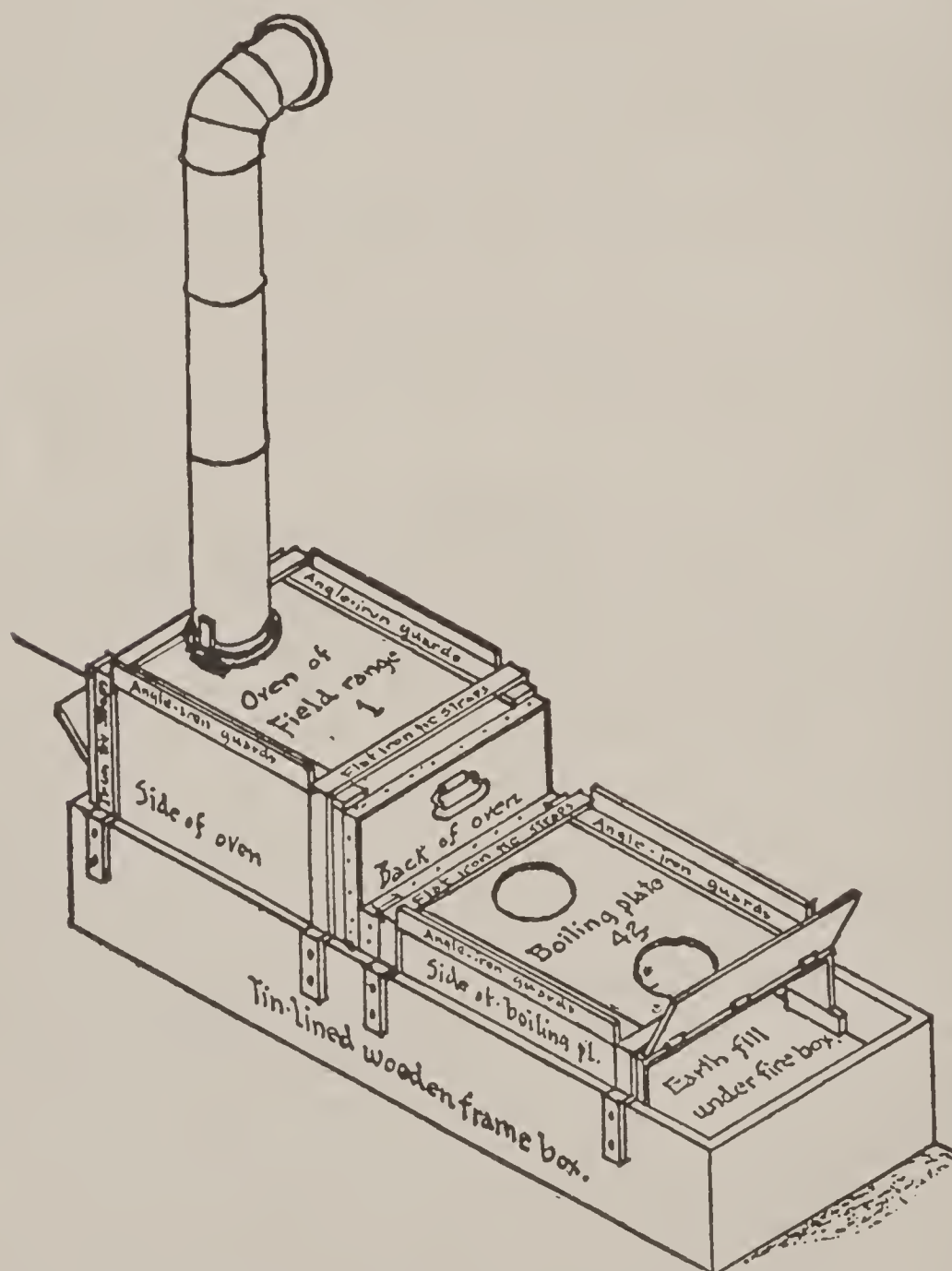
The following instructions are given for installing and dismantling field range No. 1 and boiling plate in a baggage car.

Construct a box 6 feet 8 inches long by $3\frac{1}{2}$ feet wide and about 12 inches deep, inside measurements, using $1\frac{1}{2}$ or 2 inch material if available. Line the sides, ends, and top edge of box with galvanized iron or zinc. Place box in car running lengthwise on one side of the car, about 2 feet from the side. Fill box with dirt up to about 2 inches of the top. Place a brick flush with top of dirt at each of the four corners where the range will set. Place range in box, front and oven end close up against end of box, and deep enough in box so that when oven door is opened it will lie flat on edge of box. Place boiling plate in box, the end resting on top of angle iron on rear of range. Place a brick under each front corner of boiling plate, flush with top of dirt. The Alamo attachment is not used when range No. 1 is installed in the above manner.

Fasten range and boiling plate firmly to box by means of strap iron or two or three strands of telegraph or telephone wire, at points

shown on figure. Fill space between range, boiling plate, and side of box with soft mud, to prevent heat from escaping. Three and even four field ranges may be installed in a car.

Remove one of the top ventilating windows from car; tack tent guards, furnished with each range, over the opening—one on the outside of the car and one on the inside. Carry stovepipe up and out through the opening. End of pipe should extend about 6 inches outside of the ventilator opening. Elbow should be placed on end of



Army field range 1, with boiling plate 42, back to back, in frame box, on car, for use in transit, without Alamo attachment.

pipe facing up and wired firmly to car. Wire stovepipe firmly to both sides of car.

Box can be held firmly in position on floor of car by nailing 2 by 4 inch strips around sides and ends of box. This is important and must not be neglected.

The following additional equipment to that supplied with each range is necessary:

- 2 G. I. water cans.
- 2 G. I. buckets.
- 1 elbow, stovepipe.
- 100 feet wire.

Water cans should be filled on every possible occasion where stops are made.

If the equipment is to be set up in a freight car, a hole will have to be cut in the top of car for the stovepipe, using tent guards, as explained above, to cover the opening.

181. Detachment kitchen car. This car is designed for journeys where the number of men or the distance to be traveled does not warrant the use of the standard kitchen car.

It is provided with a gas range attached to the Pintsch gas tanks, and cooks for as many men as can be carried on the car. There is no ice box or refrigerator on this car, and consequently fresh beef can not generally be carried for more than two meals, unless the weather is such that the meat may be carried in sacking on the platform. Travel rations and fresh bread for 30 men for five days can be carried in the locker and a vacant section in the car. If the detachment is without an experienced cook, travel rations should be carried, and coffee made, under the direction of the officer or noncommissioned officer in charge. On short journeys, where an experienced cook is available, the garrison ration should be provided.

The following bills of fare are considered appropriate:

	Breakfast.	Lunch.	Supper.
1	Beefsteak and gravy. Boiled potatoes. Apricots. Bread and coffee.	Baked beans. Blackberry jam. Bread and butter. Coffee.	Beef stew. Bread and butter. Coffee.
2	Cold sliced corned beef. Boiled potatoes and gravy. Canned peaches. Bread and coffee.	Cold sliced corned beef. Canned peas. Coffee. Bread.	Beefsteak. Boiled potatoes. Bread and jam. Coffee.

182. Pintsch gas cooker. This cooker is designed for the use of troops traveling in any type of car equipped with the Pintsch gas-lighting system, and practical experience has shown that sufficient gas is generally available for all cooking to be done. It has sufficient capacity for cooking for 48 men (the maximum number carried in one car) and supplies two hot components of the meal, as, for example, hot coffee and stewed corn, although but one article can be cooked at a time. One cooker is supplied with each car and contains ample utensils for cooking and serving the food, though the individual mess kits must be used.

Directions for use.—In setting up the gas cooker the work should be supervised by a commissioned officer. If none are present, then by the noncommissioned officer in charge.

(a) Set burner and stand in men's wash room or other suitable place and connect same with the nearest 4-tipped burner, as follows:

(b) Remove glass bowl and turn over to porter. Unscrew 4-cluster flame, being careful not to unscrew the cluster stem. Screw short pieces of gas tubing to cluster stem where 4-cluster flame was removed by the coupling at one end of the tubing. Then attach long piece of tubing to short piece and connect with the burner of the cooker. After the meal has been prepared disconnect long piece of tubing and allow end to remain attached to the cluster stem. When it is desired to operate the cooker, connect long piece of tubing to short piece.

If it is not practicable to make connections with a 4-cluster flame connect burner of cooker with a 1-burner bracket lamp, as follows:

With pliers remove gas tip and loosen the governing screw so as to insure a free flow of gas.

If the governing screw sticks tap lightly with the handle of the screw driver until it can be easily removed. Do not entirely unscrew the governing screw. Slip rubber end of tubing over pillar and connect other end to the burner of the cooker.

(c) The connections having been made, turn on the gas at the lamp and burner of the cooker and light with a wax taper. The greatest heat is obtained by having a strong blue flame.

(d) The burner being lighted, set on the largest copper boiler if it is desired to make coffee. The boiler should be filled about two-thirds full, additional water being added when the coffee has come to a boil.

After coffee has been made, remove and set boiler on one of the asbestos mats, to prevent damage to the floor of the car. The second boiler is then set on the burner, with such food as may be desired

to cook. Water must be added to prevent burning of food and melting the boilers. Stirring is also necessary when preparing certain foods.

It requires about 1 hour and 20 minutes to prepare coffee and cook one hot dish for 48 men.

After the meal is prepared set the galvanized-iron boiler on the burner and heat the necessary water for washing the mess kits and utensils.

Caution—

(a) Do not put boilers on without water in them.

(b) Always add a little water, about 1 quart to every 10 pounds of food to prevent burning.

(c) Remove the coffee and hot water from the copper vessels as soon as practicable, to preserve the tinning inside.

(d) Look at the gas flame occasionally, to see that it has not blown out.

(e) To reduce gas consumption and save time, get hot water for washing dishes from the locomotive.

(f) Never light the gas with boiler set on heater.

(g) If the roadbed is rough and there is considerable motion to the train, secure the stand and burner by the two leather straps furnished with the cooker. To prevent the splashing of water when coffee is made or water heated, place round slop board in the boilers so as to counteract the motion of the car.

(h) In case of leaks in the gas tubing, cut out leak with sharp knife and connect the two pieces of tubing with a coupler, wrapping ends of tubing with wire.

(i) Handle the equipment intelligently and carefully. Never pack any article unless clean and dry. When returned to a depot or post the equipment should be completely overhauled, cleaned, and tested.

The garrison ration is used when the cooker is provided and it is recommended that the following food be purchased from the credit allowance:

Beef, corned, canned.

Hash, corned-beef.

Salmon, canned.

Potatoes, about one-third of allowance.

Soft bread.

Hard bread.

Tomatoes.

Jam.
 Coffee, roasted and ground.
 Tea.
 Sugar.
 Milk, evaporated.
 Pickles.
 Salt.
 Pepper.
 Butter.
 Sirup.
 Soap.

A quantity of canned baked beans should be purchased, as they can be readily heated by the cooker and the dried beans can not be cooked en route. If the journey is an extended one, fresh onions and a small quantity of bacon may be purchased.

On account of the limited space available for cooking, it is not practicable to prepare elaborate meals, but the fare may be much improved by purchasing extra food from the company fund.

The following is a list of foods which may be prepared on the gas cooker:

Beans, stringless, canned.
 Beef stew, canned.
 Chocolate.
 Cocoa.
 Corn, canned.
 Eggs, fresh.
 Frankfurter sausage, canned or fresh.
 Fruit, fresh.
 Hominy, canned.
 Peas, canned.
 Plum pudding, canned.
 Sauerkraut, canned.
 Soups, canned.
 Vienna sausage, canned or fresh.

The following are sample bills of fare for two days when using the Pintsch gas cooker:

FIRST DAY

Breakfast:

Hot corned-beef hash.
Soft bread and butter.
Coffee.

Dinner:

Cold corned beef.
Hot baked beans.
Soft bread.
Pickles.
Coffee.

Supper:

Cold meat (boiled ham or roast beef
cooked before starting on journey).
Stewed tomatoes.
Soft bread and jam.
Tea.

SECOND DAY

Breakfast:

Hot baked beans
Soft bread and butter.
Coffee.

Dinner:

Cold meats.
Stewed tomatoes and corn.
Soft bread.
Tea.

Supper:

Hot corned-beef hash.
Soft bread.
Coffee.
Sirup.

CHAPTER XIV

CARE OF THE HEALTH

183. Importance of good health. Good health is just as necessary to any army as rifles and ammunition. Not only does every sick man take away one rifle from the firing line, but in addition he becomes a care and a burden on the hands of the army. Indeed, it is fully as important for a soldier to take care of his health as it is for him to take care of his rifle and ammunition. The importance of doing everything possible to look after one's health is shown by the fact that in every war so far, many more men have died from disease than were killed in battle or died from wounds. In our Civil War, for instance, for every man on the Union side who was killed in battle or died from wounds, two died from disease. In the Spanish-American War the proportion was 1 to 5½.

To do all that he can to keep in good health is a duty that the soldier owes his Country.

RULES FOR CARE OF HEALTH

Observance of the following will do much to add to one's comfort and to keep him in good health:

CARE OF TEETH. Take care of your teeth. Neglecting them will not only result in an uncleanly mouth, but it will also be the ultimate cause of their decay, which will result in improper chewing of food and thus result in digestive troubles. Use your tooth brush at least once a day.

KEEP THE BODY FREE OF WASTES. Get into the habit of emptying your bowels at a certain hour each day. Immediately after breakfast is a good time. This is a habit that can be cultivated just like any other habit. Cultivate it. It will do much to keep you in good health. Always empty the bowels and bladder, especially the bowels, when you have the least desire to do so. Do not allow a little personal inconvenience or laziness to prevent you from doing this. The wastes from the bowels and bladder, especially the bowels, are poisons that should always be expelled from the body just as soon as possible.

KEEP THE BODY CLEAN. A dirty body invites sickness. If possible, bathe every day in summer,—if not possible, then at least a weekly bath should be taken. When not possible to bathe, take a good, stiff rub daily with a dry towel.

KEEP THE BODY WELL EXERCISED AND WELL SUPPLIED WITH FRESH AIR. Exercise and fresh air are absolutely necessary to good health. Outdoor sports are the best form of exercise, because they use all the body muscles, and are in the open air.

GIVE THE BODY SUFFICIENT REST. Give the body enough sleep at night, which you can always do by avoiding late hours. When on the march take advantage of every halt to rest your body. As soon as the command is given to fall out, select, if possible, a good dry place on the side of the road to sit or lie on. If carrying the pack, loosen it and rest back on it, in a sitting or lying position. If the march has been a long one, lie flat on your back and raise the feet in the air. This will remove the heavy dragged feeling of the feet and legs and will rest the heart, because the blood runs out of the legs into the body.

AVOID EXPOSURE. Avoid all exposure not necessary in line of duty. Unnecessary exposure invites sickness unnecessarily.

SLEEPING OFF THE GROUND. Sleep off the ground whenever you can possibly do so. Hay, straw, dry grass, or branches of trees under the blanket, makes sleeping more comfortable and lessens the danger from dampness.

WET CLOTHING. If practicable, always remove wet clothing as soon as possible. Wet clothing does no harm on the march or at work, but it is a dangerous thing to cool off in or in which to lie around camp.

FOOD. Be careful about the food you eat. Eat what is furnished in your company mess. Avoid green and over-ripe fruit, and never eat unpeeled fruit. Don't patronize peddlers.

WATER. Be careful about the water you drink. If water that you do not know to be pure is not at hand, drink weak coffee or tea. The boiling kills the germs.

AVOID MOSQUITO BITES. Malaria, yellow, and dengue fevers can be caught only from mosquito bites—there is no other possible way of catching these fevers. By means of headnets, mosquito bars, and gloves, protect yourself as much as possible, and also keep away, if you can, from places infested with mosquitoes.

KEEP FLIES OFF YOUR FOOD. The ordinary fly is one of the worst and filthiest transmitters of disease known. By means of their smeared feet, in their spit, and in their specks, flies carry germs from privies, latrines, spittoons, and sickrooms to the food you eat.

DON'T SMOKE ON MARCHES. It has a depressing effect and increases the thirst.

DON'T DRINK ALCOHOL. Do not drink whiskey, beer, or any other form of alcohol, especially in the field. It will weaken you and favor heat exhaustion, sunstroke, frost bite, and other troubles. The soldiers who drink alcohol are always amongst the first to fall out on marches and other exercises.

COOL OFF GRADUALLY. If perspiring, always cool off gradually. Never sit in a draft, or in a chilly place. If necessary, throw a light coat or sheet over you until the body has regained its normal temperature.

BELLY. Always take special care to protect your belly from getting chilled. It is susceptible to chilling, which is likely to cause congestion that will result in cramps and diarrhœa.

DON'T OVEREAT. Don't overeat, especially if you feel exhausted, and always be sure to masticate (chew) your food thoroughly.

VENEREAL DISEASES. The best way to avoid venereal diseases is to keep away from lewd women, and live a clean moral life. It is said by medical authorities that sexual intercourse is not necessary to preserve health and manly vigor, and that the natural sexual impulse can be kept under control by avoiding associations, conversations, and thoughts of a lewd character. However, persons who will not exercise self-control in this matter can greatly lessen the risks of indulgence by the prompt use, immediately upon return to camp or garrison, of the prophylaxis prescribed by War Department orders and which all soldiers are required to take after exposing themselves to the danger of venereal infection. Men who immediately after intercourse urinate and wash the private parts thoroughly with soap and water will lessen the chances of infection. Drunkenness greatly increases the risk of infection.

CHAPTER XV

FIRST AID TO THE SICK AND INJURED

184. Main things. In offering first aid to a comrade the main things are: (1) Act promptly; (2) Keep cool; (3) Make the patient feel you have no doubt you can pull him through all right; (4) Don't let him become discouraged. Pluck has carried a man through what seemed the most forlorn hope.

185. How to proceed. In administering first aid proceed as follows: (1) Find out what the trouble is; (2) Decide promptly what treatment is necessary; (3) Make the patient as comfortable as possible and handle him gently. However, do not handle him unless it will do him a benefit; (4) To facilitate the treatment, remove the clothing, cutting it or ripping it, where necessary.

186. Bite of dog. } Either requires immediate and heroic treat-
Bite of snake. } ment. LOSE NO TIME.

1st. Prevent the poison from traveling toward the heart and brain by putting on at once a tourniquet (see Fig. 2, this chapter) between the wound and the heart.

2nd. Suck the wound and be sure to spit out the poison and rinse the mouth afterward. It is safe, if you have no cuts or sores on the lips or in the mouth.

3rd. Enlarge the wound with a knife (in the direction of the bone, not across) to make it bleed more freely, and again suck the wound.

4th. Apply to the wound any strong acid or caustic, such as carbolic acid, lime, wood ashes, or tincture of iodine, or burn it with a hot iron. Telegraph wire will do.

5th. Wash out the wound with hot water and pack with equal parts of baking soda and salt, and apply a bandage.

6th. Then, in the case of a snake bite, loosen the tourniquet little by little, taking about half an hour, so as to permit any poison that may remain in the wound to be *gradually* absorbed by the blood. In the case of a dog bite, the tourniquet is loosened at once.

After the tourniquet has been removed, the patient must rest quietly for several hours. If he feel faint, he may have a stimulant,—alcohol, coffee, or tea,—*but do not give the stimulant before the poison has been*

removed from the wound, because stimulants increase the heart beats and thereby hurry the poison into the blood.

187. Bleeding. Looking upon the heart as a pump, you will understand that to stop the current of blood pumped through the arteries you must press upon the blood vessel between the wound and the heart. In addition to the pressure, raise the leg or arm or head above the heart—this will slow the flow of the blood. The following diagram shows where pressure with the thumb will squeeze the blood tube between the thumb and the bone:



Fig. 1

Pressure with thumb at 1 checks bleeding of left side of chin, cheek, and jaw.

Pressure at 2 stops bleeding from big blood tube on left side of head and neck and face.

Pressure at 3 controls bleeding in the arm pit and shoulder.

Pressure at 4 checks bleeding in arm pit and anywhere down the arm and hand.

Pressure at 5 stops bleeding of arm and hand.

Pressure at 6, on either leg, stops bleeding of leg and foot.

However, the thumb cannot be held forever on the blood tube, so we make an artificial thumb, called a *tourniquet*, which consists of a pad, compress, pocket knife, or stone (wrapped in some soft material so as to prevent injury to the flesh), placed on the line of the artery, and pressed down by a strap or band that is tightened around the arm by means of a bayonet or stick, the bayonet or stick being fixed in place with another strap or bandage, as shown in this illustration:

A folded bandage, a handkerchief, or a necktie may be used for the strap. Remember you may do harm in two ways in using a tourniquet: (1) By using too much force you may bruise the flesh and muscles, and (2) by keeping the pressure up too long you may strangle the limb, causing what is called *gangrene*. It is a good rule to relax or ease up on the tourniquet at the end of about an hour, and allow it to remain loose, but in place, if no bleeding appears. By watching you can tighten the tourniquet at any time, if necessary.



Fig. 2

188. Broken bones. (Fractures.) You will usually know when a bone of the arm or leg is broken by the way the limb is held, for the wounded man loses power of control over the limb, and it is no longer firm and straight.

A fracture must always be handled with the greatest possible care, for otherwise the broken ends of the bone may pierce the flesh and stick out through the skin, causing a *compound fracture*, which is very serious, as it makes a doorway for germs to enter. Also, careless handling may cause the bones to grow together in a bad position, causing a deformity.

The best way to treat a broken leg or arm bone is as follows: Straighten the limb gently, pulling upon the end of it firmly, and quietly, when this is necessary, and fix or retain it in position by means of boards or other material,—bayonet, scabbard, bunch of twigs, etc.,—that will not bend. This is called “setting” the bone, and the boards or other material used are called “splints.” Always be sure to pad the splint on the side next to the limb, care being taken to secure or bind it in place, the bandage, however, never being placed over the fracture, but always above and below.

189. Fracture of arm. Apply two splints, one in front, the other behind, if the lower part of the bone is broken; or to the inner and outer sides if the fracture is in the middle or upper part; support by sling as in Fig. 3. The inner splint should be short, not more than 7 or 8 inches long.

190. Fracture of the forearm. Place the forearm across the breast, thumb up, and apply a splint to the outer surface extending to the wrist, and to the inner surface extending to the tips of the fingers; support by sling as in Fig. 4.



Fig. 3

Fig. 4

191. Fracture of the thigh. Apply a long splint, reaching from the armpit to beyond the foot on the outside, and a short splint on the inside (Fig. 5). The military rifle may be used as an outside splint, but its application needs care. A blanket rolled into two rolls, forming a trough for the limb, is useful.



Fig. 5

The carbine boot may be used to advantage in splinting fracture of the thigh and leg, as illustrated in Figs. 6 and 7.



Fig. 6



Fig. 7

192. Fracture of the leg. Apply two splints, one on the outside, the other on the inside of the limb. When nothing better can be had, support may be given by a roll of clothing and two sticks, as shown in Fig. 8.

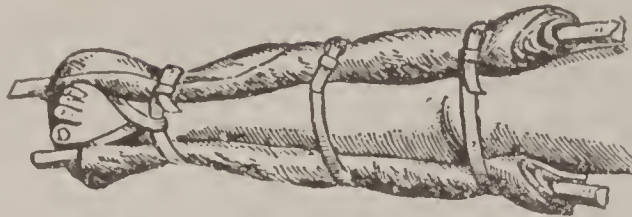


Fig. 8

Many surgeons think that the method of fixing the wounded leg to its fellow, and of binding the arm to the body, is the best plan for the field, as the quickest and as serving the immediate purpose.



Fig. 9

Fracture of Left Leg, Supported by Sound Leg

The object of all this is to prevent, as far as possible, any motion of the broken bone, and so limit the injury to the neighboring muscles, and to lessen the pain.

Be very careful always to handle a broken limb gently. Do not turn or twist it more than is necessary to get it straight, but secure it quickly and firmly in one of the ways shown, and so make the patient comfortable for carriage to the dressing station or hospital. Time is not to be wasted in complicated dressings.

193. Burns. Do not pull the clothing from the burnt part, but rip or cut it off. Do not break the blisters, nor prick them even if large. Protect a burn quickly with a mixture of equal parts of linseed or olive oil and limewater, if you have them; or with the plain oil, covering the whole with lint or cotton wool. Put nothing on a burn that will be difficult to remove afterwards.

194. Drowning. Being under water for four or five minutes is generally fatal, but an effort to revive the apparently drowned should always be made unless it is known that the body has been under water for a very long time. The attempt to revive the patient should not be delayed for the purpose of removing his clothes or

placing him in the ambulance. Begin the procedure as soon as he is out of the water, on the shore or in the boat. The first and most important thing is to start artificial respiration without delay.

The problem is:

1. To get the water out of the lungs.
2. To get the air into the lungs and start the man breathing before the heart stops.

Therefore:

1. Remove the mud, mucus, etc., and pull the tongue forward.
2. Place the patient's head lower than his chest so the water will run out. Thus:



Fig. 10

3. Then lay the patient on a blanket, if possible, and on his stomach, arms extended from his body beyond his head, face turned to one side so that the mouth and nose do not touch the ground. (See Fig. 11.) This position causes the tongue to fall forward of its own weight and so prevents it from falling back into the air passages. Turning the head to one side prevents the face coming into contact with mud or water during the operation.

Kneel and straddle the patient's hips, facing his head. (Fig. 11.)

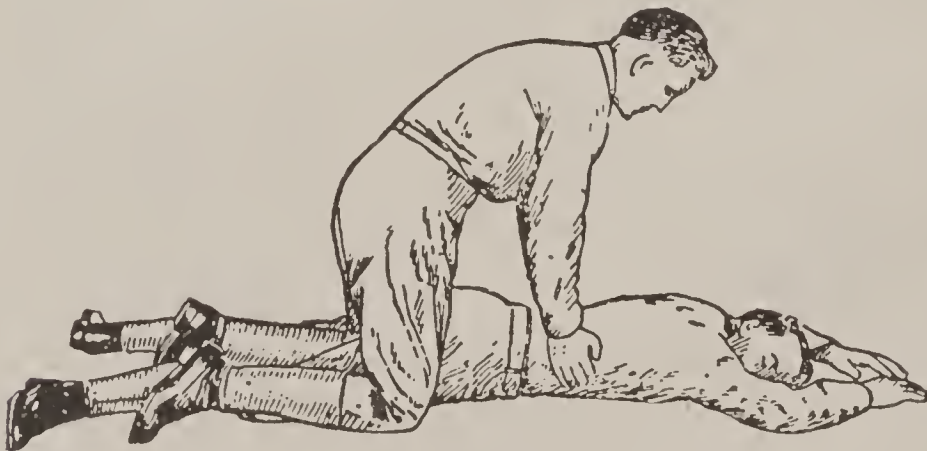


Fig. 11

Roll or rip off the clothing so as to get at the bare back.

Locate the lowest rib, and with your thumbs extending in about the same direction as your fingers, place your spread hands so that your little finger curls over the lowest rib. *Be sure to get the hands well away from the back bone*—the nearer the ends of the ribs the hands are placed without sliding off, the better it is.

Then with your arms *held straight*, press *down* SLOWLY AND STEADILY on the ribs, bringing the weight of your body straight from your shoulders. **Do not bend your elbows and shove in from the side.**

Release the pressure suddenly, removing the hands from the body entirely, and thus allowing the chest to fill with air.

Wait a couple of seconds, so as to give the air time to get into the blood. This is most important.

Repeat the pressure and continue doing so, slowly and steadily pressing down at the rate of ordinary breathing. That is to say, pressure and release of pressure (one complete respiration) should occupy about five seconds. Guide yourself by your own deep regular breathing, or by counting.

Keep up for at least one hour the effort to revive the patient and much longer if there is any sign of revival by way of speaking, breathing, coughing, sneezing, or gurgling sounds.

Do not stop working at the first signs of life, but keep it up until the patient is breathing well and is conscious. If you stop too soon he may stop breathing and die.

Persons have been revived after two hours of steady work, but most cases revive within about thirty minutes.

If you are a heavy man, be careful not to bring too much force on the ribs, as you might break one of them.

In the case of women or thin persons place a roll of clothing under them at the waist line before beginning the pressure.

If you happen to be of light build and the patient is a large heavy person, you will be able to apply the pressure better by raising your knees from the ground, and supporting yourself entirely on your toes and the heels of your hands, properly placed on the floating ribs of the patient.

Do not attempt to give liquids of any kind to the patient while he is unconscious, for he cannot swallow them. They will merely run into his wind-pipe and choke him, and, furthermore, it will take up valuable time.

However, after the patient has regained consciousness you may give him hot coffee or hot whisky, punch, or aromatic spirits of ammonia (a teaspoonful in water).

Then wrap up the patient warmly in hot blankets with hot water bottles, and take him to the nearest hospital or put him to bed and send for a doctor. Why? Because the dirty water in the lungs has damaged the lining and the patient is in danger of lung fever and needs care and nursing.

Aromatic spirits of ammonia may be poured on a handkerchief and held continuously within about three inches of the face and nose. If other ammonia preparations are used, they should be diluted or held farther away. Try it on your own nose first.

The above method of artificial respiration is also applicable in cases of electric shock, suffocation by gas and smoke.

195. Freezing. If a man is overcome by the cold, do not take him into a warm room, or heated tent. Put him into a cool room without draughts and get a doctor at once. Meanwhile loosen his clothing and rub arms and legs towards the heart with cold water and a towel or sponge, using pressure.

When he revives give him hot drinks and wrap him up well in hot blankets and put him in the hospital.

When freezing to death a man feels overcome with sleepiness and stupor. Take a switch or stick and beat him unmercifully. Remember that falling to sleep means death.

196. Frost-bite. The best way to get frost-bitten is to have on damp clothing, such as wet shoes and socks or mittens. The first feeling of frost-bite is numbness, and the first sign is marble whiteness.

Treatment. Rub the frozen part briskly with snow or ice cold water, if the frost-bite has just occurred. If it has been frozen more than fifteen minutes, *rub very gently* with snow, cold water, or coal oil (kerosene). If you rub hard, it will break the frozen flesh.

Returning pinkness is a sign of thawing; if the parts turn a dark color, see a surgeon at once, for it means gangrene (death of the flesh).

When thawed out apply plenty of oil, tallow, or vaseline.

If gangrene has set in and no doctor is available, then treat as a burn.

By all means keep away from heat. To toast frost-bitten fingers or toes before a fire is liable to result in chilblanes.

197. Poison. When poison has been swallowed, cause the patient to take a large quantity of luke-warm water and make him vomit by putting his finger in his throat. Repeat this and then have him swallow the white of two eggs or some milk into which raw flour or corn-starch has been stirred.

If you know he took bichloride of mercury, you may increase the amount of eggs and give one-half glass of weak lime water.

If you know he took carbolic acid, give him alcohol (pure alcohol or in the form of gin or whiskey) and plenty of it in order to neutralize the acid.

Get a doctor as soon as possible, and save the vomit and poison not taken, for him to see.

198. Shock. In case of collapse following an accident, treat the accident; then treat as for fainting. Apply hot plates, stones, or bottles of hot water, or an electric light wrapped in towels over the stomach. Wrap up warmly. Keep the patient quiet, in the dark, and send for a doctor.

199. Sunstroke. In sunstroke the man has a blazing red face, dry, burning hot skin; agitated heart; snoring breathing; a high fever, and is unconscious and delirious. *What is the matter?* The part of the brain which regulates the heat of the body is overcome by the heat and loses control—the man is entirely too hot all the way through.

Treatment. First of all remove the pack and shoes and loosen the clothing. Then souse the man, clothing and all, with water. Lay him in the shade and fan him, keeping him covered and wet. This will cool him off without chilling too much. If possible, rub the chest and legs, but not the belly, with ice.

200. Wounds. When a bullet enters or goes through the muscles or soft parts of the body alone, generally nothing need be done except to protect the wound or wounds with the contents of the first-aid packet, used as follows:

1. If there is one wound, carefully remove the paper from one of the two packages without unfolding the compress or bandage and hold by grasping the outside folds between the thumb and fingers.

When ready to dress wound, open compress by pulling on the two side folds of bandage, being careful not to touch the inside of the compress with the fingers or anything else.

Still holding one roll of the bandage in each hand, apply the compress to the wound and wrap the ends of the bandage around the limb or part until near the ends, when the ends may be tied together or

fastened with safety pins. The second compress and bandage may be applied over the first or may, if the arm is wounded, be used as a sling.

2. If there are two wounds opposite each other, use one compress opened out—but with the folded bandage on the back—for one wound, and hold it in place by the bandage of the compress used to cover the other wound.

3. If there are two wounds, not opposite each other, apply a compress to each.

4. If the wound is too large to be covered by the compress, find and break the stitch holding the compress together, unfold it, and apply as directed above.

Be careful not to touch the wound with your fingers nor handle it in any way, for the dirt of your hands is harmful, and you must disturb a wound as little as possible. Never wash the wound except under the orders of a medical officer.

The bandaging will stop all ordinary bleeding. Generally this is all that is necessary for the first treatment, and sometimes it is all that is needed for several days. The importance of the care with which this first dressing is made cannot be too seriously insisted upon. It is better to leave a wound undressed than to dress it carelessly or ignorantly, so that the dressing must soon be removed.

201. Fainting. Fainting is caused by the blood leaving the head. Therefore, we must get the blood back into the head, which is done by placing the patient on his back, with the head lower than the rest of the body. If necessary, make, by digging, a slight depression in the ground for the head, neck and upper part of shoulders. Also, the head may be placed lower than the rest of the body by putting a couple of folded blankets, a few folded coats or any other suitable article under the body, and raising the feet by hand or otherwise. The clothing should be loosened by unbuttoning and the patient fanned. Give him as much fresh air as possible,—so, do not let people crowd around him. Mop the face and forehead with a handkerchief soaked in cold water.

CHAPTER XVI

FIELD ENGINEERING

BRIDGES

202. Dimensions and guard rail. A roadway 9 ft. wide in the clear should be provided to pass infantry in fours, cavalry two abreast, and military wagons in one direction; a width of 6 ft. will suffice for infantry in column of twos, cavalry in single file, and field guns passed over by hand.

The *clear width* of roadway of an ordinary highway bridge should not be less than 12 ft. for single track, or 20 ft. for double track.

The *clear head room* in ordinary military bridges should not be less than 9 ft. for wagons and cavalry; for highway bridges not less than 14 ft.

Ramps at the ends of a bridge, if intended for artillery, should not be steeper than 1 on 7. For animals, slopes steeper than 1 on 10 are inconvenient.

If the bridges are high, hand rails should be provided. A single rope may suffice, or it may have brush placed upon it to form a screen.

A guard rail should be provided along each side of the roadway, near the ends of the flooring planks. In hasty bridges it may be secured by a lashing or lashings through the planking to the stringer underneath. Otherwise it may be fastened with spikes or bolts.

203. Spar bridges. This name is applied to bridges built of round timbers lashed together. Intermediate points of support are provided by inclined frames acting as struts to transmit weight from the middle of the bridge to the banks. The single-lock and double-lock bridges with two and three spans of 15 ft., respectively, are the ones of most utility.

The first step in constructing a spar bridge is to measure the gap to be bridged and select the position of the footings on either bank. Determine the distance from each footing to the middle point of the roadway if a single-lock, or the two corresponding points of a double-lock bridge. Next determine and mark on each spar except the diagonals the places where other spars cross it. The marking may

be done with chalk, or with an ax. If possible a convenient notation should be adopted. As, for example, in marking with chalk, a ring around the spar where the edge of the crossing spar will come, and a diagonal cross on the part which will be hidden by the crossing spar.

A simple way to determine the length of spars is the following: Take two small lines somewhat longer than the width of the gap,

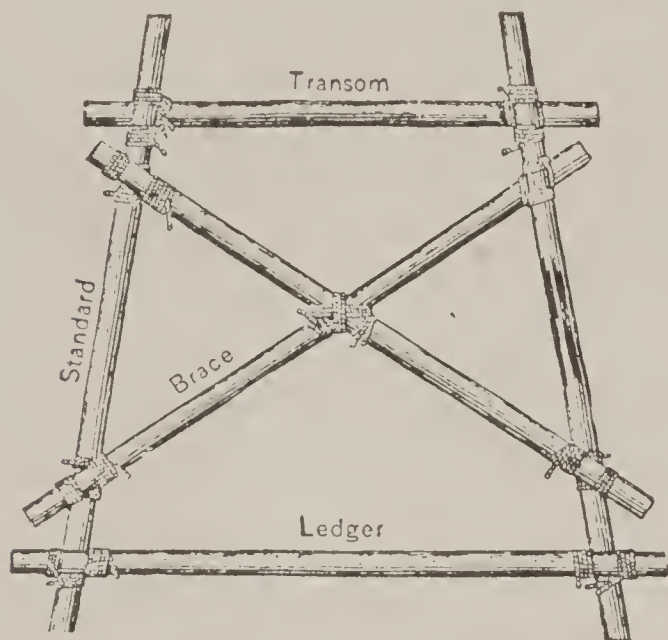


Fig. 1

AC and AC' are the lengths of struts from butt to top of transom, and with 3 ft. added, give the total length of spars required.

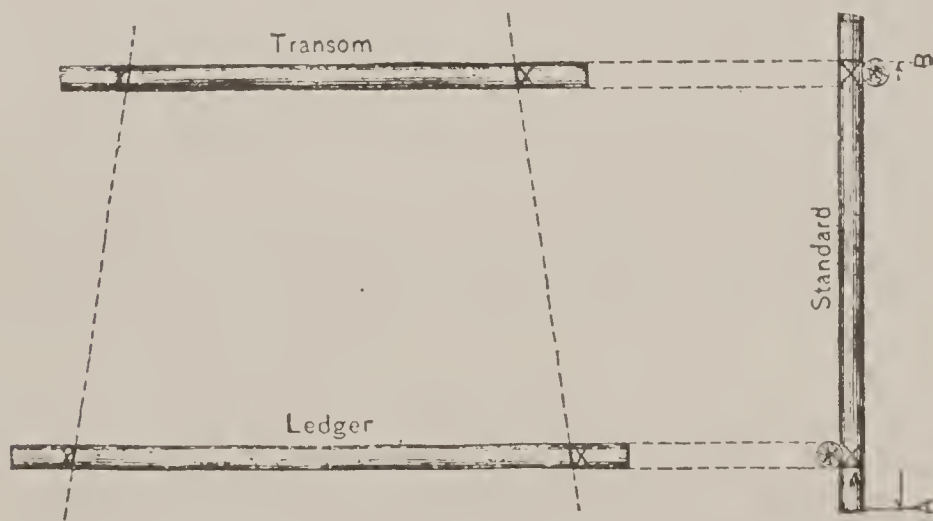


Fig. 2

If desired, a section of the gap may be laid down on the ground in full size and the lengths of spars determined by laying them in place.

double each and lash the bights together. Stretch them tightly across the gap so that the lashing comes at the middle as at A , Fig. 8. Release one end of each and stretch it to the footing on the same side as indicated by the dotted lines. Mark each line at the footing C or C' , and at the position chosen for the abutment sill, B or B' . Cut the lashing and take each piece of rope to its own side. The distances AB and AB' are the lengths between the transoms, and with 2 ft. added give the length of road bearers required. The distances

For a double-lock bridge, a piece of rope of a length equal to the length of the middle bay replaces the lashing. If the banks are not parallel, a measurement should be taken on each side of the bridge.

Military Bridges

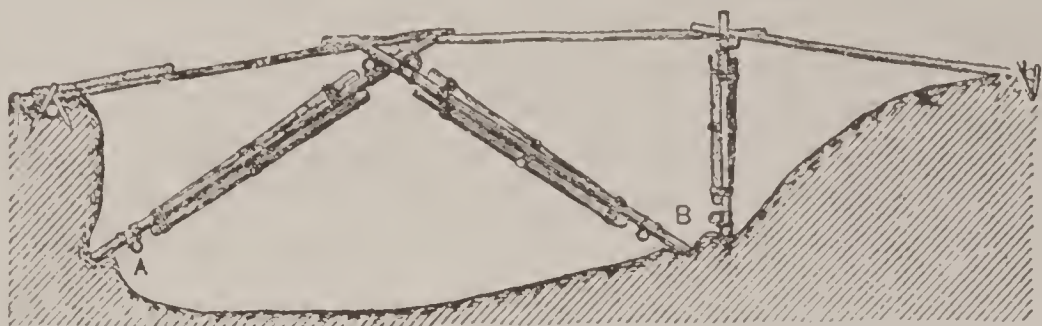


Fig. 3

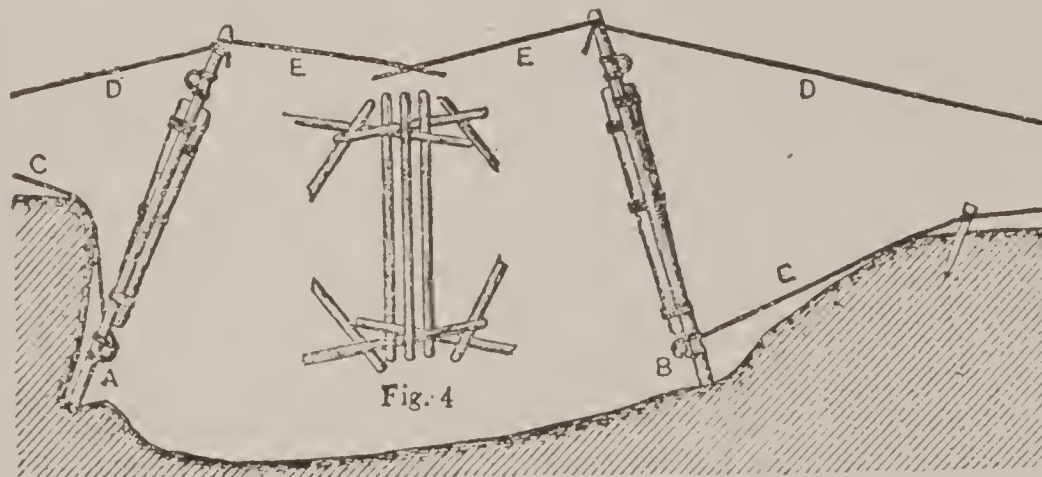


Fig. 4

Fig. 5

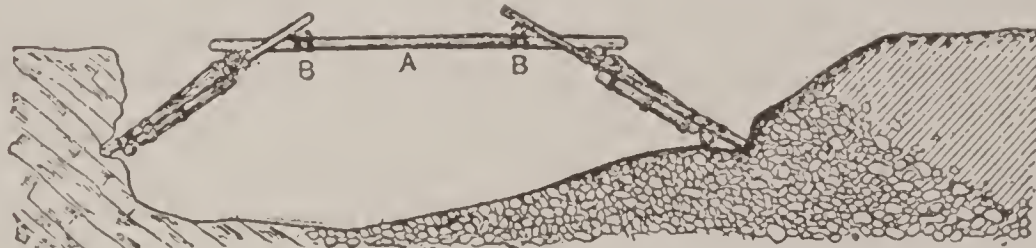


Fig. 6



Fig. 7

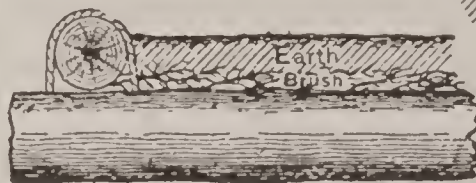


Fig. 9

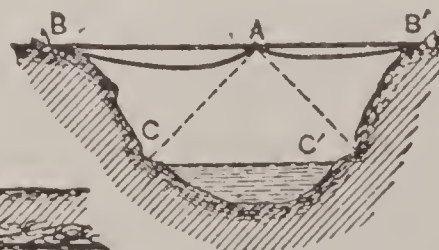


Fig. 8

This method, though given as standard by all authorities, requires more time and more handling of material than the other and gives no better results.

The construction of a frame is shown in Fig. 1, and the system of marking in Fig. 2. The arrangement of frames to form a single-lock bridge is shown in Figs. 3 and 4, and a double-lock bridge in Fig. 6.

204. Construction of single-lock bridges, Figs. 3, 4, and 5.—Suitable for spans of 30 ft. or less. The two frames lock together at the center of the span; their slope must not be more than 4 on 7. The bridge can be erected by two or three noncommissioned officers and 20 men, one-half on each side of the gap. Heavy spars require more men.

The footings at *A* and *B* must be firm, horizontal if possible, and at right angles to the axis of the bridge. In a masonry pier they may be cut out. In firm soil a simple trench will suffice. In yielding soil a plank or sill must be laid in the trench. The frames are made of such length as to give a slight camber to the bridge, which may be increased to allow for probable settlement of the footings. The inside dimension of one frame is made slightly greater than the outside dimension of the other, so that one frame may fall inside of the other when hauled into position. For a 9 ft. roadway the standards of the narrow (inside) frame should be 9 ft. 6 ins. apart at the transom and 10 ft. 6 ins. at the ledger, in the clear, and the other (outside) frame 1 ft. 6 ins. wider throughout.

A frame is constructed on each bank. The standards are laid on the ground in prolongation of the bridge, butts toward the bank. The ledgers are lashed on *above* and the transoms *beneath* the standards at the positions marked. The diagonal braces are lashed to the standards, two butts and one tip above the latter, and to each other. Before the braces are lashed the frame must be square by checking the measurements of the diagonals.

If necessary, pickets for the foot and guy ropes are driven, the former about 2 paces from the bank and 4 paces on each side of the axis of the bridge; the latter about 20 paces from the bank and 10 paces on each side of the axis. The foot ropes, *CC*, Fig. 5, are secured by timber hitches to the butts of the standards and the back and fore guys, *DD* and *EE*, to the tips the fore guys are passed across to the opposite bank. The guys of the *narrow* frame should be *inside* the guys and standards of the wide frame.

The frames are put into position one after the other, or simultaneously if there are enough men. A man is told off to each foot rope and one to each back guy to slack off as required, two turns

being taken with each of these ropes around their respective pickets. The other men raise the frame and launch it forward, assisted by the men at the fore guys, until the frame is balanced on the edge of the bank. The frame is then tilted until the butts rest on the footing, by slacking off the foot ropes and hauling on the fore guys, Fig. 5. After the head of the frame has been hauled over beyond the perpendicular, it is lowered nearly into its final position by slacking off the back guys. When the two frames are in this position opposite each other, the narrow frame is further lowered until its standards rest upon the transom of the other. The wider (outer) frame is then lowered until the two lock into each other, the standards of each resting upon the transom of the other.

The center or fork transom, Figs. 3 and 4, is then passed from shore and placed in the fork between the two frames. This forms the central support to receive a floor system of two bays, built as already described.

The estimated time for construction of such a bridge is about one hour if the material is available and in position on both sides of the stream. The construction of the roadway requires about twenty minutes; forming footings in masonry about one hour.

205. Construction of double-lock bridge, Fig. 6.—Suitable for spans not exceeding 45 ft., and consisting of two inclined frames which lock into a connecting horizontal frame of two or more distance pieces, with cross transoms, dividing the gap to be bridged into three equal bays of about 15 ft. The force required is two or three noncommissioned officers and 25 to 50 men; the time for construction, except roadway, about two and one-half hours; extra time to be allowed for difficult footings.

The width of gap is measured, the position of footings determined, and the length of standards from butt to transom determined and marked as before.

The inclined frames in this case are built of equal widths, launched as before, and held by guys just above their final position. Two stringers are launched out from each bank to the main transom. The distance pieces, Fig. 6, are put into position inside the standards, using tackle if necessary, and the road transoms are placed and lashed to the distance pieces at the places marked. Both frames are now lowered until they jam.

206. Roadway of spar bridge. For infantry in fours crowded the transoms should have a diam. of not less than 9 ins. for a span of 15 ft. Five stringers 2 ft. 3 ins. c. to c., and 6 ins. diam. at the tip

will suffice. If the sticks vary in size, the larger ones should be notched down on the transom so as to bring the tops in the same plane. The stringers should be long enough to overlap the transoms, and should be lashed together at each tip. The floor is held down by side rails over the outside stringers and lashed to them. If lumber can not be obtained, a floor may be made of small spars, the interstices filled with brush, and the whole covered with loam or clay; Figs. 7 and 9.

Corduoy Roads

207. Corduroying is done by laying logs crosswise of the road and touching each other. The result will be better if the logs are nearly of the same size. The butts and tips should alternate. If the logs are large the spaces may be filled with smaller poles. The bottom tier of logs should be evenly bedded and should have a firm bearing at the ends and not ride on the middle. The filling poles, if used, should be cut and trimmed to lie close, packing them about the ends if necessary. If the soil is only moderately soft the logs need be no longer than the width of the road. In soft marsh it may be necessary to make them longer.

The logs may be utilized as the wearing surface. In fact this is usually the case. They make a rough surface, uncomfortable for passengers and hard on wagons and loads, but the resistance to traction is much less than would be expected, and the roughness and slightly yielding surface make excellent footing for animals. Surface corduroy is perishable and can last but a short time. In marshes, where the logs can be placed below the ground-water level, they are preserved from decay, and if any suitable material can be found, to put a thin embankment over them, a good permanent road may be made.

Any tough, fibrous material may be used to temporarily harden the surface of a road. Hay or straw, tall weeds, corn and cane stalks have been used to good advantage. Such materials should be laid with the fibers crosswise of the road, and covered with a thin layer of earth, thrown on from the sides; except in sand, when it is better to dig a shallow trench across the road, fill it with the material and then dig another trench just in front of and in contact with the first and throw the sand from it back onto the material in the first trench, etc.

Brush work

208. A fascine is a cylindrical bundle of brush, closely bound. The usual length is 18 ft. and the diam. 9 ins. when compressed. Lengths of 9 and 6 ft., which are sometimes used, are most conveni-

ently obtained by sawing a standard fascine into 2 or 3 pieces. The weight of a fascine of partially seasoned material will average 140 lbs.

Fascines are made in a **cradle** which consists of five trestles. A **trestle** is made of two sticks about 6½ ft. long and 3 ins. in diam., driven into the ground and lashed at the intersection as shown in Fig. 10. In making a cradle, plant the end trestles 16 ft. apart and parallel. Stretch a line from one to the other over the intersection, place the others 4 ft. apart and lash them so that each intersection comes fairly to the line.

To build a fascine, straight pieces of brush, 1 or 2 ins. at the butt, are laid on, the butts projecting at the end 1 ft. beyond the trestle. Leaves should be stripped and unruly branches cut off, or partially cut through, so that they will lie close. The larger straighter brush should be laid on the outside, butts alternating in direction, and smaller stuff in the center. The general object is to so dispose the brush as to make the fascine of uniform size, strength, and stiffness from end to end.

When the cradle is nearly filled, the fascine is compressed or **choked** by the **fascine choker**, Fig. 11, which consists of 2 bars 4 ft. long, joined at 18 ins. from the ends by a chain 4 ft. long. The chain is marked at 14 ins. each way from the middle by inserting a ring or special link. To use, two men standing on opposite sides pass the chain under the brush, place the short ends of the handles on top and pass the bars, short end first, across to each other. They then bear down on the long ends until the marks on the chain come together. Chokers may be improvised from sticks and rope or wire.

Binding will be done with a double turn of wire or tarred rope. It should be done in 12 places, 18 ins. apart, the end binders 3 ins. outside the end trestles. To bind a fascine will require 66 ft. of wire.

Improvised binders may be made from rods of live brush, hickory or hazel is the best. Place the butt under the foot and twist the rod to partially separate the fibers and make it flexible. A rod so prepared is called a **withe**. To use a withe, make a half turn and twist at the smaller end, Fig. 12; pass the withe around the brush and the large end through the eye. Draw taut and double the large end back, taking 2 half-hitches over its own standing part, Fig. 13.

When the fascine is choked and bound, saw the ends off square, 9 ins. outside the end binders. After a cradle is made, 4 men can make 1 fascine per hour, with wire binding. Withes require 1 man more.

A **fascine revetment** is made by placing the fascines as shown in Fig. 14. The use of headers and anchors is absolutely necessary in

loose soils only, but they greatly strengthen the revetment in any case. A fascine revetment **must always be crowned** with sods or bags.

209. In all brush weaving the following terms have been adopted and are convenient to use:

Randing. Weaving a single rod in and out between pickets.

Slewing. Weaving two or more rods together in the same way.

Pairing. Carrying two rods together, crossing each other in and out at each picket.

Wattling. A general term applied to the woven part of brush construction.

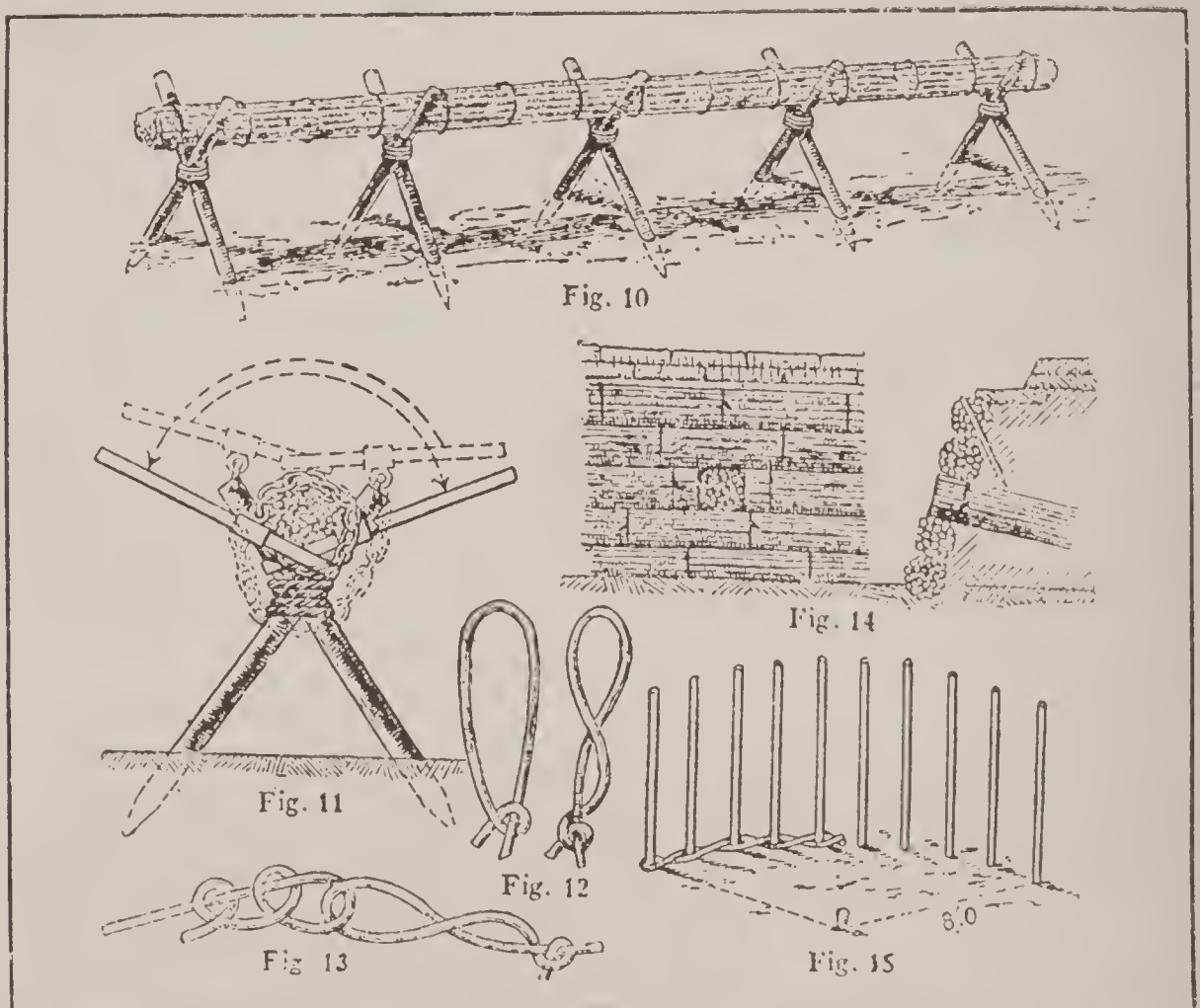


Plate II

210. A hurdle is a basket work made of brushwood. If made in pieces, the usual size is 2 ft. 9 ins. by 6 ft., though the width may be varied so that it will cover the desired height of slope.

A hurdle is made by describing on the ground an arc of a circle of 8 ft. radius and on the arc driving 10 pickets, 8 ins. apart, covering 6 ft. out to out, Fig. 15. Brush is then woven in and out and well com-

pacted. The concave side of a hurdle should be placed next the earth. It wraps less than if made flat.

In weaving the hurdle, begin randing at the middle space at the bottom. Reaching the end, twist the rod as described for a withe, but at one point only, bend it around the end picket and work back. Start a second rod before the first one is quite out, slewing the two for a short distance. Hammer the wattling down snug on the pickets with a block of wood and continue until the top is reached. It improves the hurdle to finish the edges with two selected rods paired, Fig. 16. A pairing may be introduced in the middle, if desired, to give the hurdle extra endurance if it is to be used as a pavement or floor. If the hurdle is not to be used at once, or if it is to be transported, it must be sewed. The sewing is done with wire, twine, or withes at each end and in the middle, with stitches about 6 ins. long, as shown in Fig. 16. About 40 ft. of wire is required to sew one hurdle. No. 14 is about the right size, and a coil of 100 lbs. will sew 40 hurdles. Three men should make a hurdle in 2 hours, 2 wattling and the third preparing the rods.

211. Continuous hurdle. If conditions permit the revetment to be built in place, the hurdle is made continuous for considerable lengths. The pickets may be larger; they are driven farther apart, 12 or 18 ins., and the brush may be heavier. The construction is more rapid. The pickets are driven with a little more slant than is intended and must be anchored to the parapet. A line of poles with wire attached at intervals of 2 or 3 pickets will answer. The wires should be made fast to the pickets after the wattling is done. They will interfere with the weaving if fastened sooner. Two men should make 4 yds. of continuous hurdle of ordinary height in one hour.

212. Brush revetment. Pickets may be set as above described and the brush laid inside of them without weaving, being held in place by bringing the earth up with it. In this case the anchors must be fastened before the brush laying begins. The wires are not much in the way in this operation.

213. Gabion making. A gabion is a cylindrical basket with open ends, made of brush woven on pickets or stakes as described for hurdles. The usual size is 2 ft. outside diam. and 2 ft. 9 ins. height of wattling. On account of the sharp curvature somewhat better brush is required for gabions than will do for hurdles.

The gabion form, Fig. 17, is of wood, 21 ins. diam., with equidistant notches around the circumference, equal in number to the number of pickets to be used, usually 8 to 14, less if the brush is large

213 (contd.)

and stiff, more if it is small and pliable. The notches should be of such depth that the pickets will project to 1 in. outside the circle.

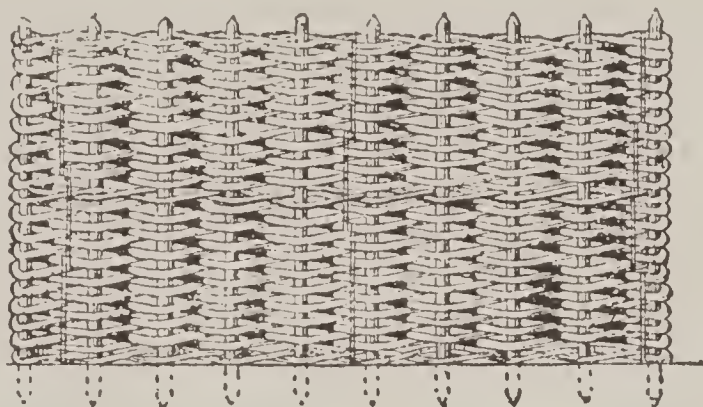


Fig. 16

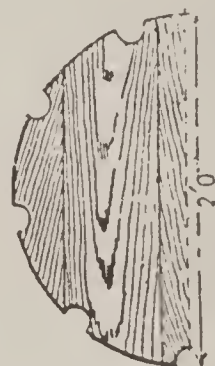


Fig. 17

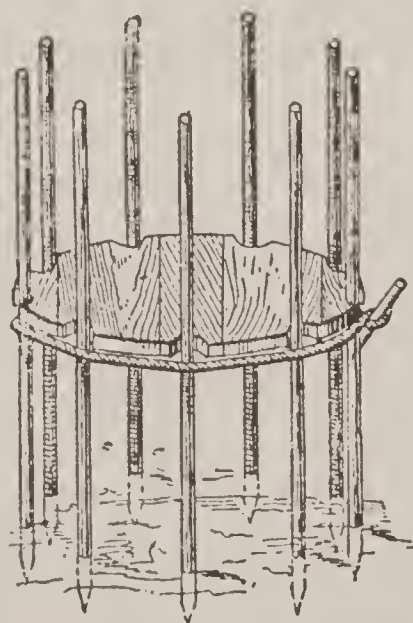


Fig. 18

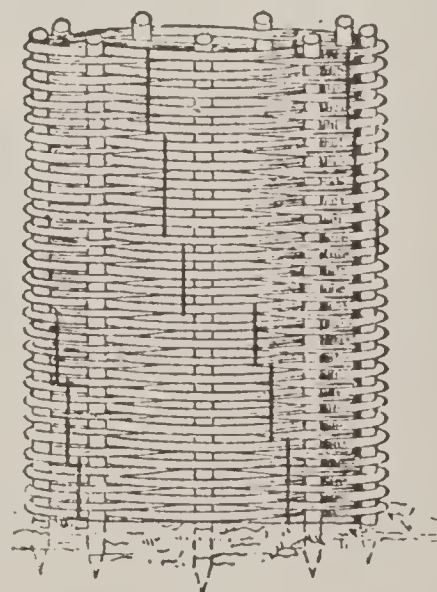


Fig. 19

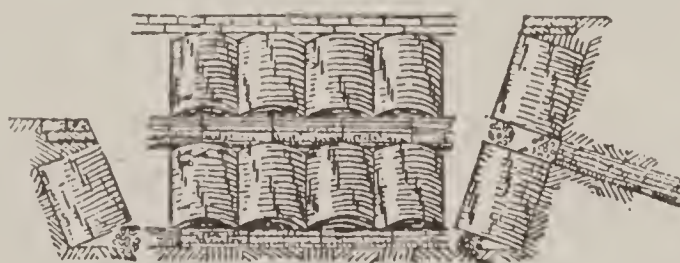


Fig. 20

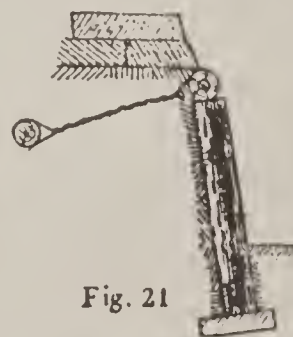


Fig. 21

The pickets should be $1\frac{1}{4}$ to $1\frac{3}{4}$ ins. diam., 3 ft. 6 ins. long and sharpened, half at the small and half at the large end.

To make a gabion, the form is placed on the ground, level or nearly so, and the pickets are driven vertically in the notches, large and small ends down, alternately. The form is then raised a foot and held by placing a lashing around outside the pickets, tightened with a rack stick, Fig. 18. The wattling is randed or slewed from the form up. The form is then dropped down, the gabion inverted and the wattling completed. If the brush is small, uniform, and pliable, pairing will make a better wattling than randing. If not for immediate use, the gabion must be sewed as described for hurdles, the same quantity of wire being required.

The gabion, when wattled and sewed, is completed by cutting off the tops of the pickets 1 in. from the web, the bottom 3 ins., the latter sharpened after cutting, and driving a carrying picket through the middle of its length and a little on side of the axis. See that the middle of this picket is smooth. Three men should make a gabion in an hour.

Gabions may be made without the forms, but the work is slower and not so good. The circle is struck on the ground and the pickets driven at the proper points. The weaving is done from the ground up and the entire time of one man is required to keep the pickets in proper position.

If brush is scarce, gabions may be made with 6 ins. of wattling at each end, the middle left open. In filling, the open part may be lined with straw, grass, brush cuttings, or grain sacks, to keep the earth from running out.

214. Gabion revetment. The use of gabions in revetments is illustrated in Fig. 20. If more than two tiers are used, the separating fascines should be anchored back. Gabion revetments should be crowned with sods or bags.

The advantages of the gabion revetment are very great. It can be put in place without extra labor and faster and with less exposure than any other. It is self-supporting and gives cover from view and partial cover from fire quicker than any other form.

Several forms of gabions of other material than brush have been used. Sheet iron and iron and paper hoops are some of them. The iron splinters badly, is heavy, and has not given satisfaction. If any special materials are supplied the method of using them will, in view of the foregoing explanation, be obvious.

215. Timber or pole revetment. Poles too large for use in any other way may be cut to length and stood on end to form a revetment. The lower ends should be in a small trench and have a waling piece in front of them. There must also be a waling piece or cap at or near the top, anchored back. Fig. 21 shows this form.

216. Miscellaneous revetments. Any receptacles for earth which will make a stable, compact pile, as **boxes, baskets, oil or other cans,** may be used for a revetment. **Barrels** may be used for gabions. **Canvas** stretched behind pickets is well thought of in a foreign service. If the soil will make **adobe**, or sun-dried bricks, an excellent revetment may be made of them, but it will not stand wet weather.



Fig. 22
Square or Reef

217. Square or reef knot, Fig. 22, commonly used for joining two ropes of the same size. The standing and running parts of each rope must pass through the loop of the other in the same direction, i. e., from above downward or vice versa; otherwise a *granny*, is made, which is a useless knot that will not hold. The reef knot can be upset by taking one end of the rope and its standing part and pulling them in opposite directions. With dry rope a reef knot is as strong as the rope; with wet rope it slips before the rope breaks, while a double sheet bend is found to hold.

218. Two half hitches, Fig. 23, especially useful for belaying, or making fast the end of a rope round its own standing part. The end may be lashed down or seized to the standing part with a piece of spun yarn; this adds to its security and prevents slipping.

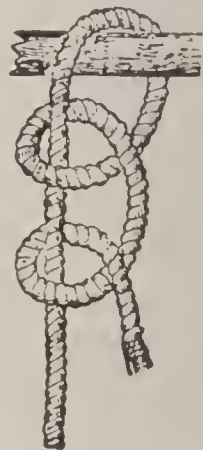


Fig. 23
Two half hitches

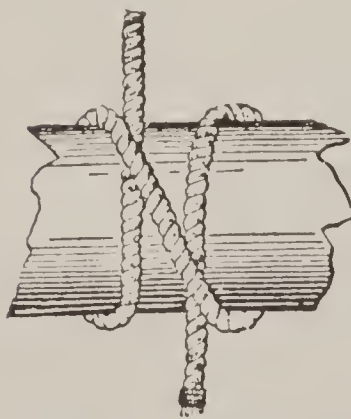


Fig. 24
Clove hitch

219. Clove hitch, Fig. 24, generally used for fastening a rope at right angles to a spar or at the commencement of a lashing. If the end of the spar is free, the hitch is made by first forming two loops, as in Fig. 26, placing the right-hand loop over the other one and slipping the double loop (Fig. 27) over the end of the spar. If this can not be done, pass the end of the rope round the spar, bring it up to the right of the standing part, cross over the latter, make another turn round

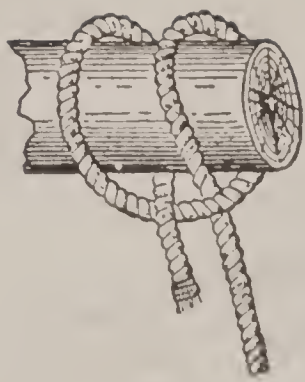


Fig. 25

the spar, and bring up the end between the spar, the last turn, and the standing part, Fig. 25.

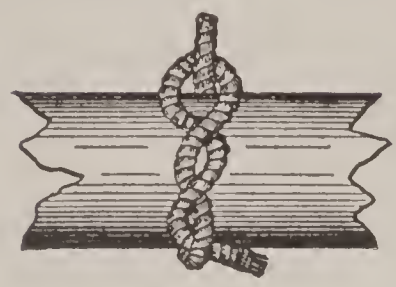


Fig. 28
Timber hitch

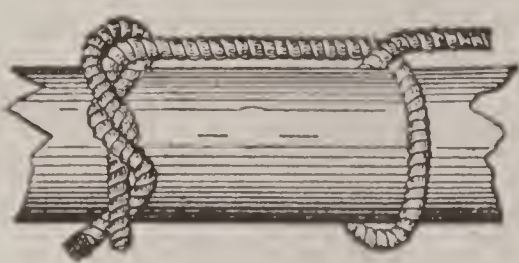


Fig. 29
Timber hitch and half hitch



Fig. 26
Clove hitch



Fig. 27

etc., the knot should be made with a long end, which is formed into two half hitches round the standing part

and secured to it with spun yarn.

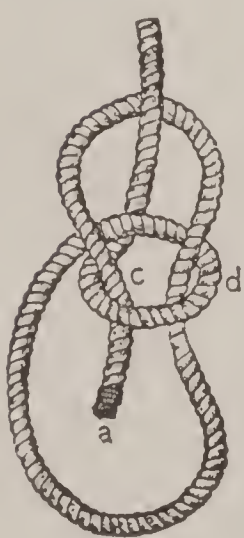


Fig. 30
Bowline

220. Timber hitch, Fig. 28, used for hauling and lifting spars. It can easily be loosed when the strain is taken off, but will not slip under a pull. When used for hauling spars, a half hitch is added near the end of the spar, Fig. 29.

221. Bowline, Fig. 30, forms a loop that will not slip. Make loop with the standing part of the rope underneath, pass the end from below through the loop, over the part round the standing part of the rope, and then down through the loop *c*. The length of bight depends upon the purpose for which the knot is required.

222. Bowline on a bight, Fig. 31. The first part is made like the above,

with the double part of a rope; then the bight *a* is pulled through sufficiently to allow it to be bent past *d* and come up in the position shown. It

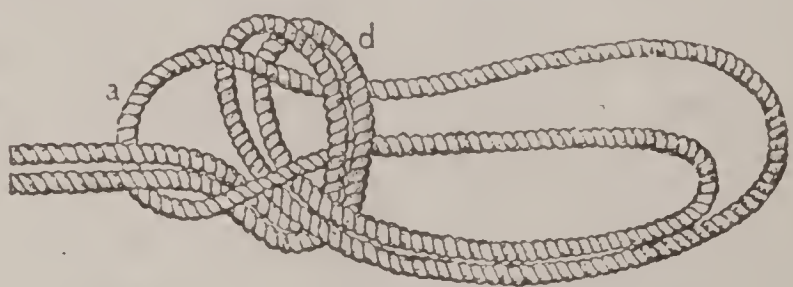


Fig. 31
Bowline on a Bight

makes a more comfortable sling for a man than a single bight.



Fig. 32
Sheep shank

222¹/₂. Sheep shank, Fig. 32, used for shortening a rope or to pass by a weak spot; a half hitch is taken with the standing parts around the bights.

223. Short splice. To make a *short splice*, Figs. 33, 34, 35, unlay the strands of each rope for a convenient length. Bring the rope ends together so that each strand of one rope lies between the two consecutive strands of the other rope. Draw the strands of the first rope along the second and grasp with one hand. Then work a free strand of the second rope over the nearest strand of the first rope and under the second strand, working in a direction opposite to the twist of the rope. The same operation applied to all the strands will give the result shown by Fig. 34. The splicing may be continued in the same manner to any extent (Fig. 35) and the free ends of the strands may be cut off when desired. The splice may be neatly tapered by cutting out a few fibers from each strand each time it is passed through the rope. Rolling under a board or the foot will make the splice compact.

224. Long splice (Figs. 36, 37).—Unlay the strands of each rope for a convenient length and bring together as for a short splice. Unlay to any desired length a strand, *d*, of one rope, laying in its place the nearest strand, *a*, of the other rope. Repeat the operation in the opposite direction with two other strands, *c* and *f*. Fig. 37 shows strands *c* and *f* secured by tying together. Strands *b* and *e* are shown secured by unlaying half of each for a suitable length and laying half of the other in place of the unlayed portions, the loose ends being passed through the rope. This splice is used when the rope is to run through a block. The diameter of the rope is not enlarged at the splice. The ends of the strands should not be trimmed off close until the splice has been thoroughly stretched by work.

225. Eye splice (Figs. 38, 39, 40, 41).—Unlay a convenient length of rope. Pass one loose strand, *a*, under one strand of the rope, as shown in fig. 38, forming an eye of the proper size. Pass a second loose strand, *b*, under the strand of the rope next to the strand which secures *a*, Fig. 39. Pass the third strand, *c*, under the strand next to that which secures *b*, fig. 40. Draw all taut and continue and complete as for a short splice.



Fig. 33 Short Splice



Fig. 34 Short Splice



Fig. 35 Short Splice

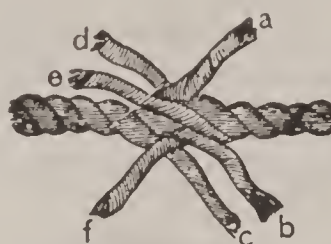


Fig. 36 Long Splice

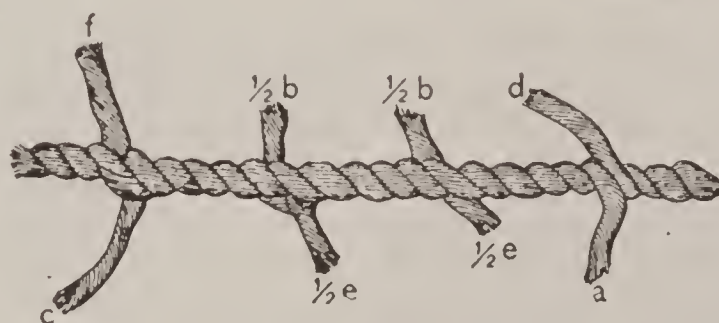


Fig. 37 Long Splice

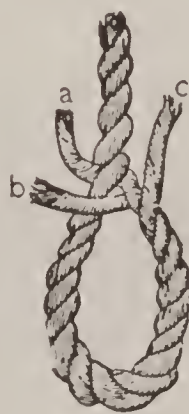


Fig. 38

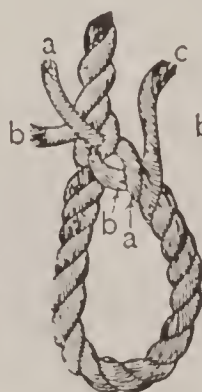


Fig. 39

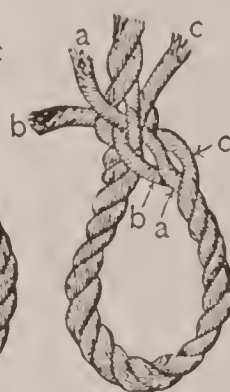


Fig. 40



Fig. 41

Lashings

226. To lash a transom to an upright spar, Fig. 42, transom in front of upright.—A clove hitch is made round the upright a few inches below the transom. The lashing is brought under the transom, up in front of it, horizontally behind the upright, down in front of the transom, and back behind the upright at the level of the bottom of the transom and above the clove hitch. The following turns are kept outside the previous ones on one spar and inside on the other, not riding over the turns already made. Four turns or more are required. A couple of frapping turns are then taken between the spars, around the lashing, and the lashing is finished off either round one of the spars or any part of the lashing through which the rope can be passed. The final clove hitch should never be made around the spar on the side toward which the stress is to come, as it may jam and be difficult to remove. The lashing must be well beaten with handspike or pick handle to tighten it up. This is called a square lashing.

227. Lashing for a pair of shears, Fig. 43.—The two spars for the shears are laid alongside of each other with their butts on the ground, the points below where the lashing is to be resting on a skid. A clove hitch is made round one spar and the lashing taken loosely eight or nine times about the two spars above it without riding. A couple of frapping turns are then taken between the spars and the lashing is finished off with a clove hitch above the turns on one of the spars. The butts of the spars are then opened out and a sling passed over the fork, to which the block is hooked or lashed, and fore and back guys are made fast with clove hitches to the bottom and top spars, respectively, just above the fork, Fig. 44.

228. To lash three spars together as for a gin or tripod.—Mark on each spar the distance from the butt to the center of the lashing. Lay two of the spars parallel to each other with an interval a little greater than the diameter. Rest their tips on a skid and lay the third spar between them with its butt in the opposite direction so that the marks on the three spars will be in line. Make a clove hitch on one of the outer spars below the lashing and take eight or nine loose turns around the three, as shown in Fig. 45. Take a couple of frapping turns between each pair of spars in succession and finish with a clove hitch on the central spar above the lashing. Pass a sling over the lashing and the tripod is ready for raising.

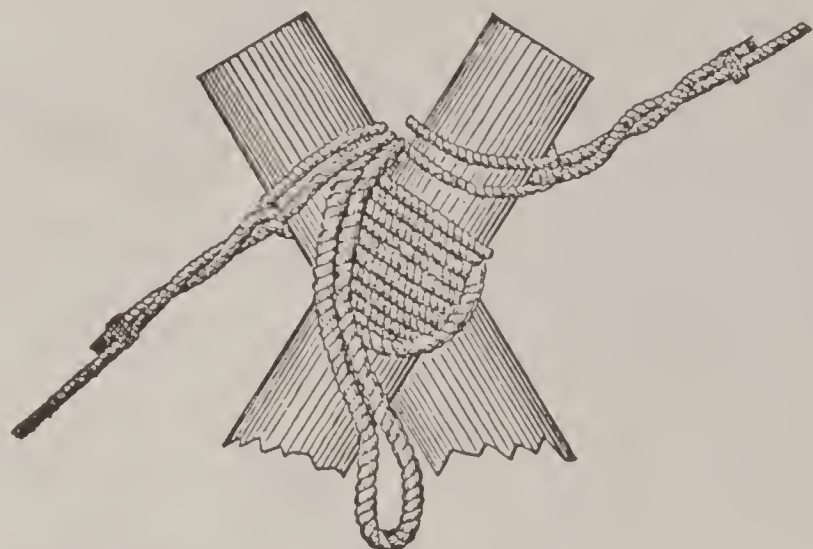


Fig. 44

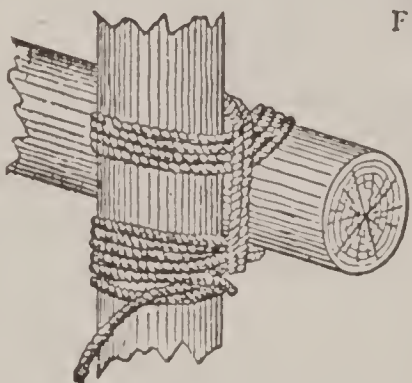


Fig. 42

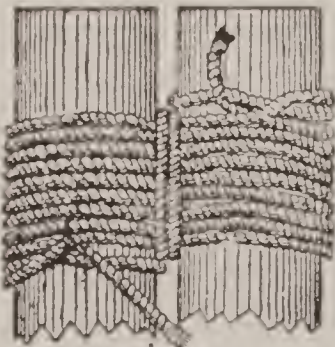


Fig. 43

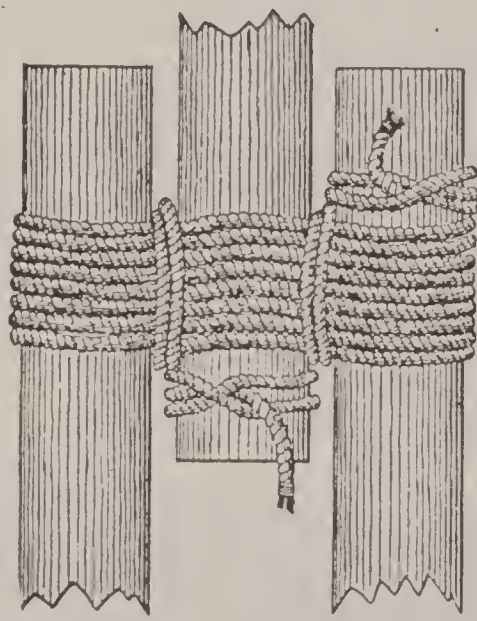


Fig. 45

229. Holdfasts.—To prepare a fastening in the ground for the attachment of guys or purchases, stout pickets are driven into the ground one behind the other, in the line of pull. The head of each picket except the last is secured by a lashing to the foot of the picket next behind, Fig. 46. The lashings are tightened by rack sticks, the points of which are driven into the ground to hold them in position. The distance between the stakes should be several times the height of the stake above the ground.

Another form requiring more labor but having much greater strength is called a "*deadman*," and consists of a log laid in a transverse trench with an inclined trench intersecting it at its middle point. The cable is passed down the inclined trench, takes several round turns on the log, and is fastened to it by half hitches and marlin stopping, Figs. 47, 48, 49. If the cable is to lead horizontally or inclined downward, it should pass over a log at the outlet of the inclined trench, Fig. 48. If the cable is to lead upward, this log is not necessary, but the anchor log must be buried deeper.

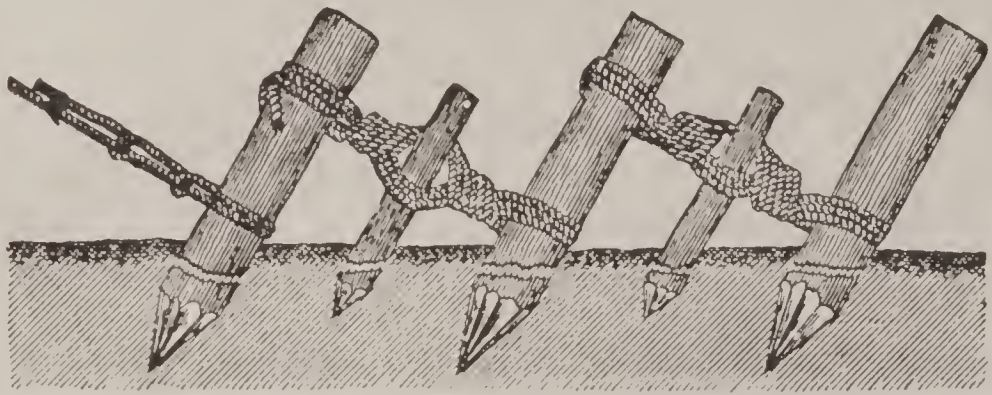


Fig. 46

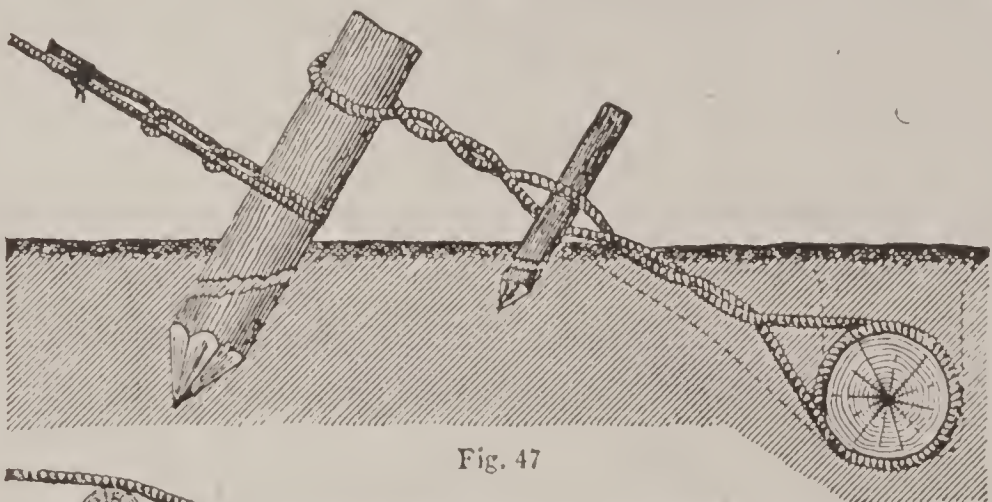


Fig. 47

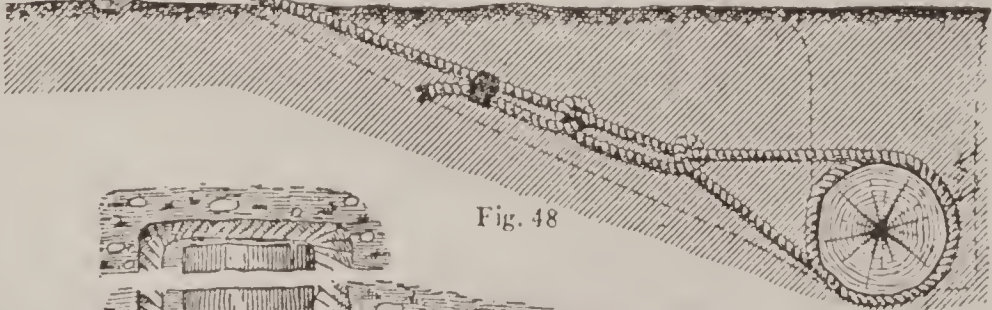


Fig. 48

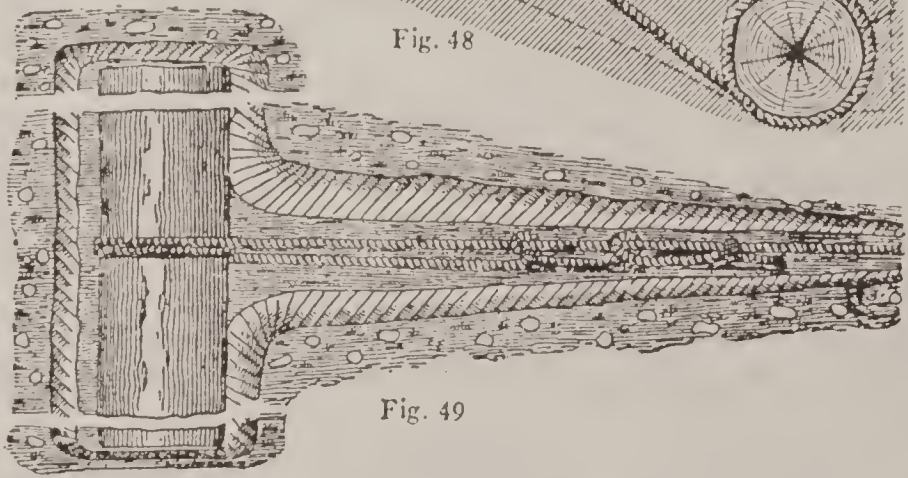


Fig. 49

CHAPTER XVII

FIELD FORTIFICATIONS

230. Object. The object of field fortifications is twofold.

- 1. To increase the fighting power of troops by enabling the soldier to use his weapons with the greatest possible effect.
- 2. To protect the soldier against the enemy's fire.

230½. How these objects are accomplished.

These objects are accomplished:

- 1. By means of shelters—trenches, redoubts, splinterproofs, etc., which protect the soldier from the enemy's fire.
- 2. By means of obstacles—wire entanglements, abatis, pits, etc., which delay the advance of the enemy.

231. Classification. Field fortifications are usually divided into three classes, hasty intrenchments, deliberate intrenchments and siege works.

Nomenclature of the Trench. The following illustration shows the names of the various parts of the trench.

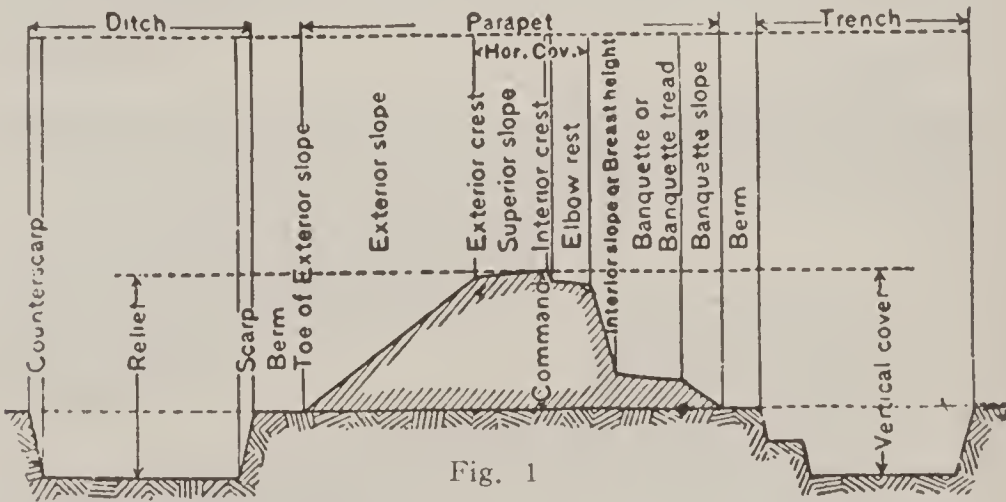


Fig. 1

232. Hasty intrenchments include trenches dug by troops upon the battlefield to increase their fighting power. They are usually constructed in the presence of the enemy and in haste and embrace three forms, viz.:—the **lying trench**, the **kneeling trench**, and the **standing trench**.

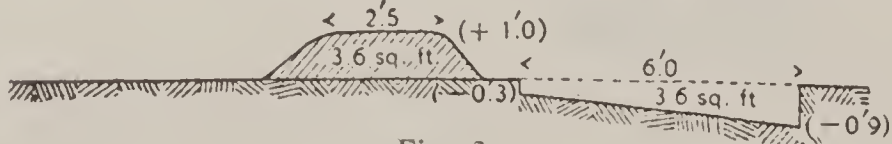


Fig. 2

233. Lying trench. (Fig. 2.) This trench gives cover to a man lying down. When intrenching under fire the rifle trench can be constructed by a man lying down. He can mask himself from view in about 10 to 12 minutes and can complete the trench in 40 to 45 minutes. A good method is to dig a trench 18 inches wide back to his knees, roll into it and dig 12 inches wide alongside of it and down to the feet, then roll into the second cut and extend the first one back.



Fig. 2a
Intrenching under fire

Conditions may require men to work in pairs, one firing while the other uses his intrenching tool. Duties are exchanged from time to time until the trench is completed.

The height of the parapet should not exceed 1 foot. This trench affords limited protection against rifle fire and less against shrapnel.

234. Kneeling trench. (Fig. 3.) Time permitting the lying trench may be enlarged and deepened until the kneeling trench has been constructed.

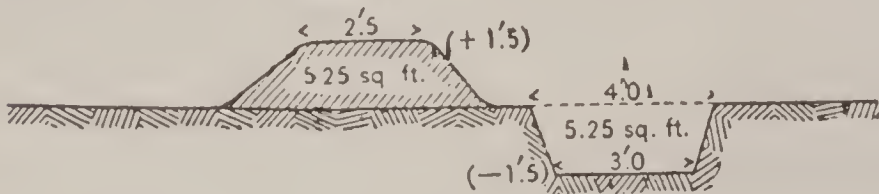


Fig. 3

The width of the bottom should be 2½ feet—preferably 3 feet—and the relief (distance from

bottom of trench to top of parapet) is 3 feet—the proper height for firing over in a kneeling position.

235. Standing trench (Fig. 4) has a bottom width of 3 to 3½ feet and a relief of 4½ feet which is the proper firing height for men of average stature.

As this trench does not give complete cover to men standing

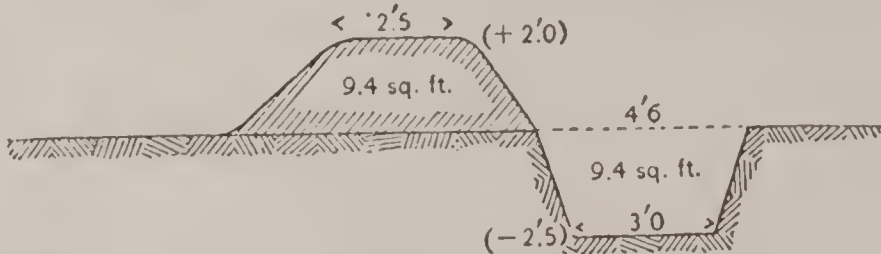


Fig. 4

in it a passage way should be constructed in rear of it not less

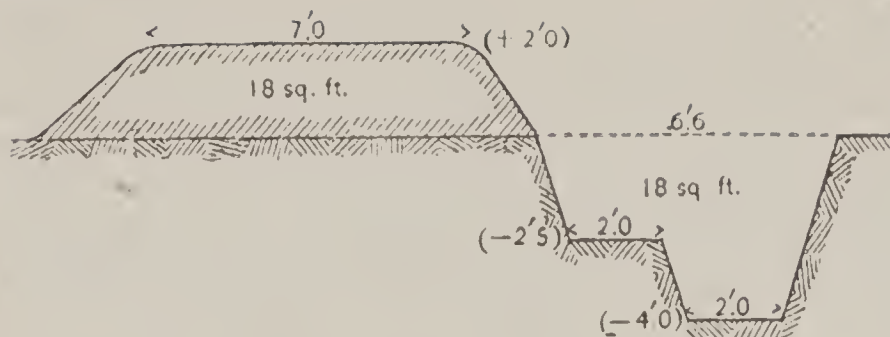


Fig. 5

than 6 feet below the interior crest. This forms the complete trench (Fig. 5). Figures 6-7-8 show simple standing trenches used in the European War.

236. Deliberate

ate intrenchments comprise trenches and works constructed by troops not in line of battle and are usually intended to enable a small force to resist a much larger one. It frequently happens that hasty intrenchments are developed into deliberate intrenchments and from this stage pass into the domain of

Simple Standing Trench, Parapet Suppressed.

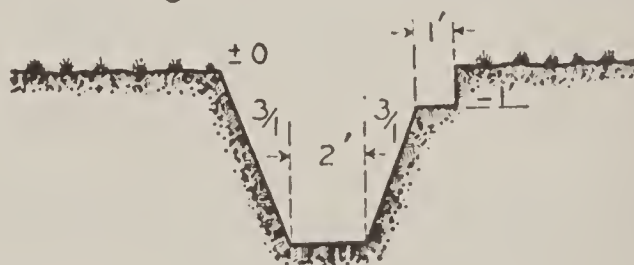


Fig. 6

siege works.

Simple Standing Trench, Rocky Ground

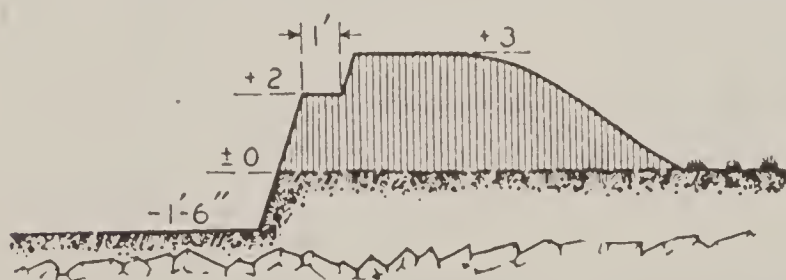


Fig. 7

237. Fire trenches,—the trenches which shelter the firing line,—are of different types. No fixed type can be prescribed. The type must be selected with due regard to the terrain, enemy, time,

tools, soil, etc., but all should conform to the requirements of a good field of fire, and protection for the troops behind a vertical wall, preferably with some head or overhead cover.

The simplest form of fire trench is deep and narrow and has a flat con-

Narrow Firing Trench with Parados

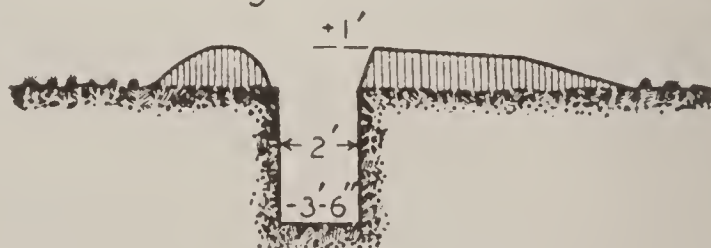


Fig. 8

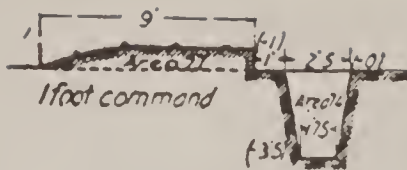


Fig 9.

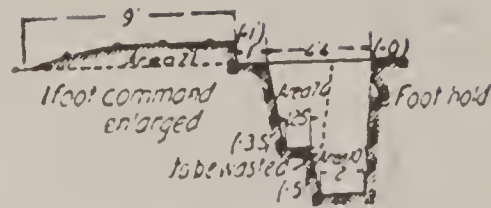


Fig. 10

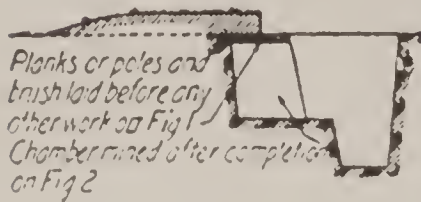


Fig. 11

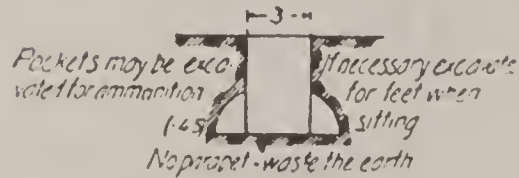


Fig. 12

cealed parapet (Fig. 9). When time will permit the simple trench should be planned with a view to developing it into a more complete form (Figs. 10 and 11). In all trenches as soon as practicable a passage way—2 feet wide at the bottom—should be provided, in rear of the firing step, for the men carrying supplies, ammunition, etc., and for the removal of the wounded.

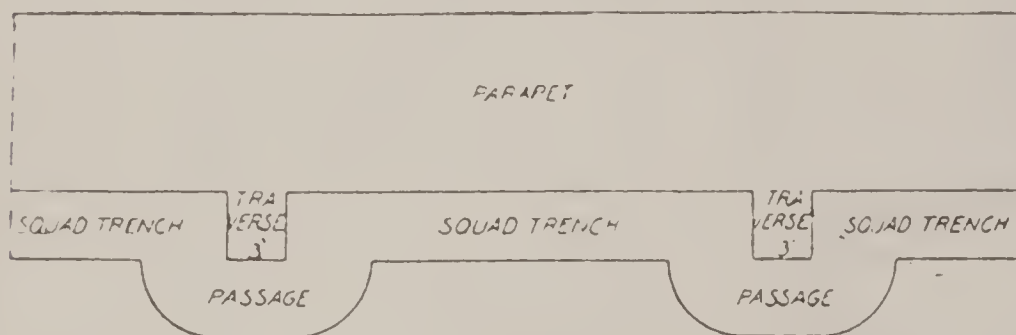


Fig. 13

When the excavated earth is easily removed a fire trench without parapet may be the

one best suited to the soil and other conditions affecting the conditions of profile (Fig. 12). The enemy's infantry as well as artillery will generally have great difficulty in seeing this trench. Fig. 13 shows a squad trench. Fig. 14 shows a fire trench provided

Protection against Shrapnel

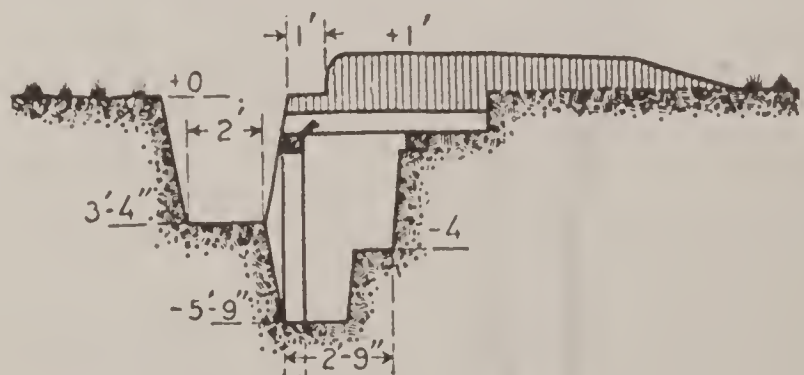
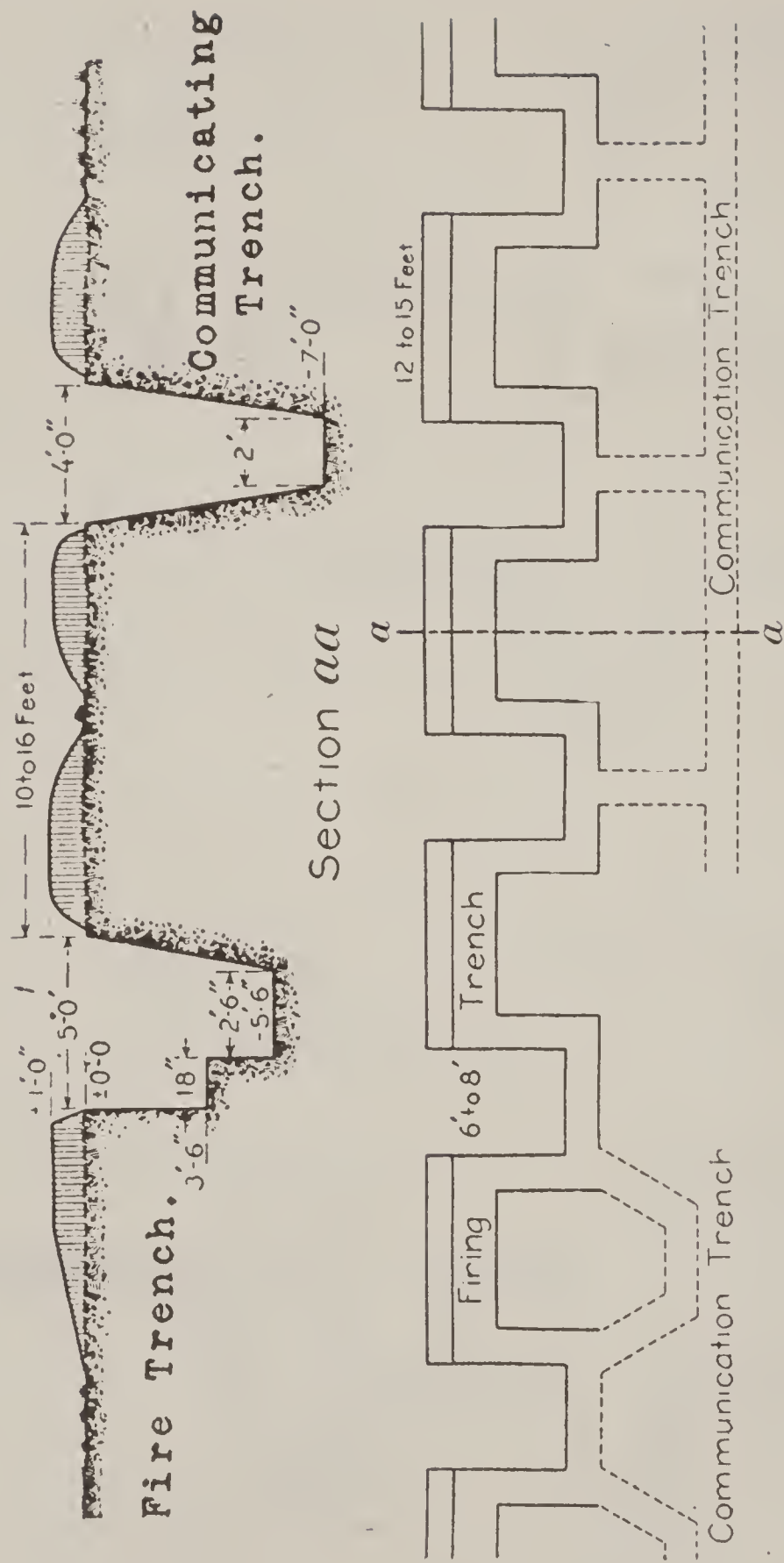
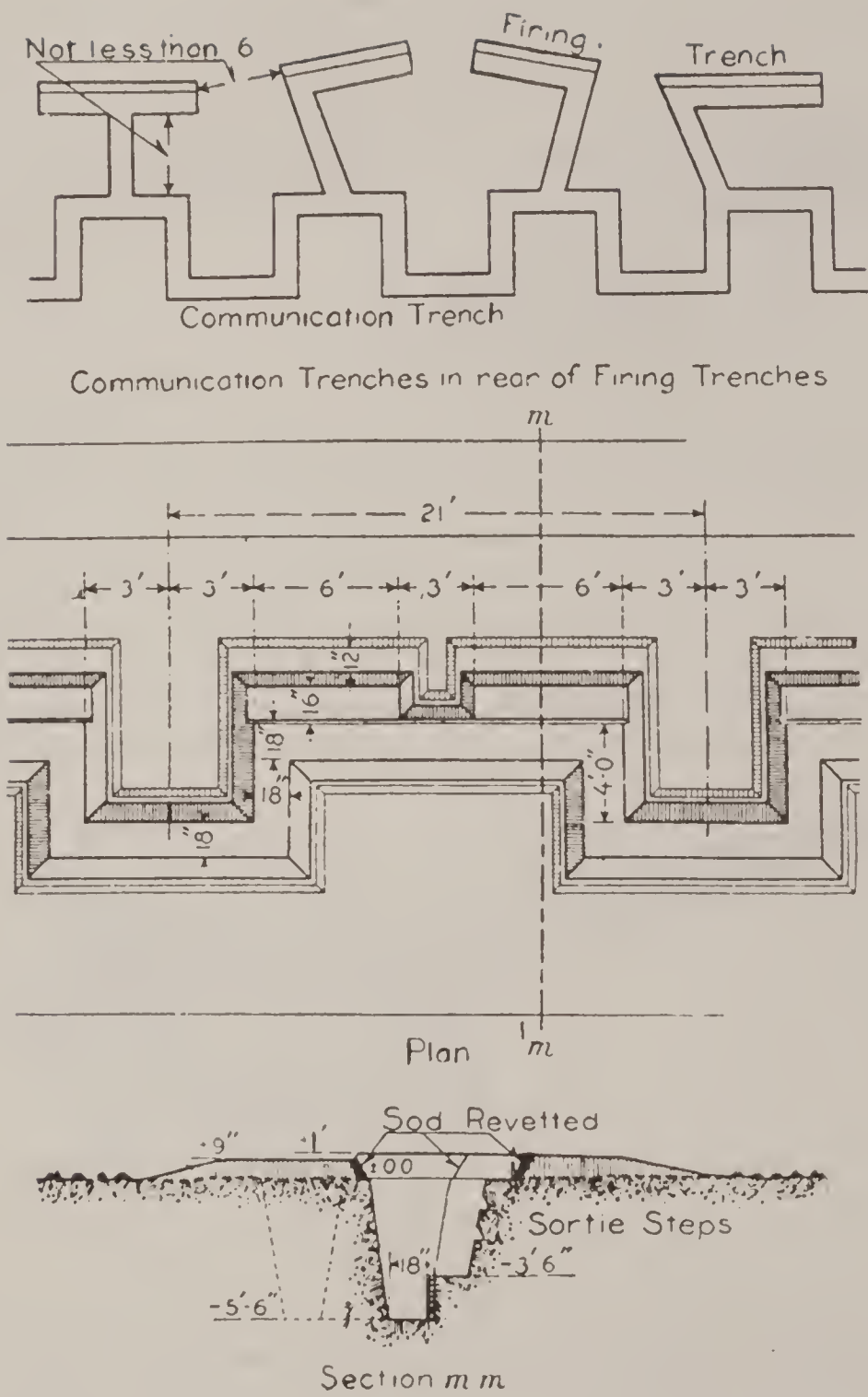


Fig. 14



Two Methods for Communication Trenches in rear of Firing Trenches

Fig. 15



Recessed and Traversed Firing Trench

Fig. 16

with protection against shrapnel. This trench is used in the European War.

In the European War the aim in constructing fire trenches seems

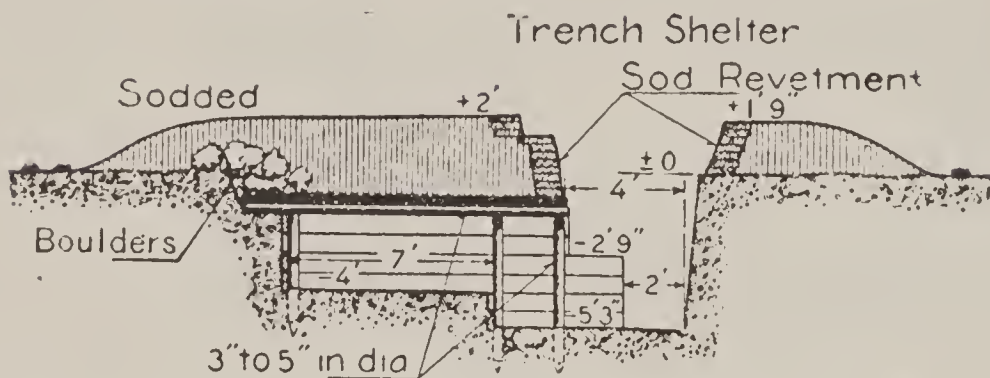


Fig. 17

to be to minimize and localize artillery effect as far as possible. The main excavation along the front is a continuous,

very deep communication, not in itself prepared for active defense. The actual firing is done from banquettes or firing steps just to the front of the passage or from trenches dug as far as 5 or 10 feet in front of the main excavation and reached by short passages. Figs. 15 and 16 show the type of this construction. Fig. 17 shows a fire trench with parades and shelter.

238. Traverses. Fire trenches are divided into sections or bays by means of **traverses** which intercept side or enflade fire and limit

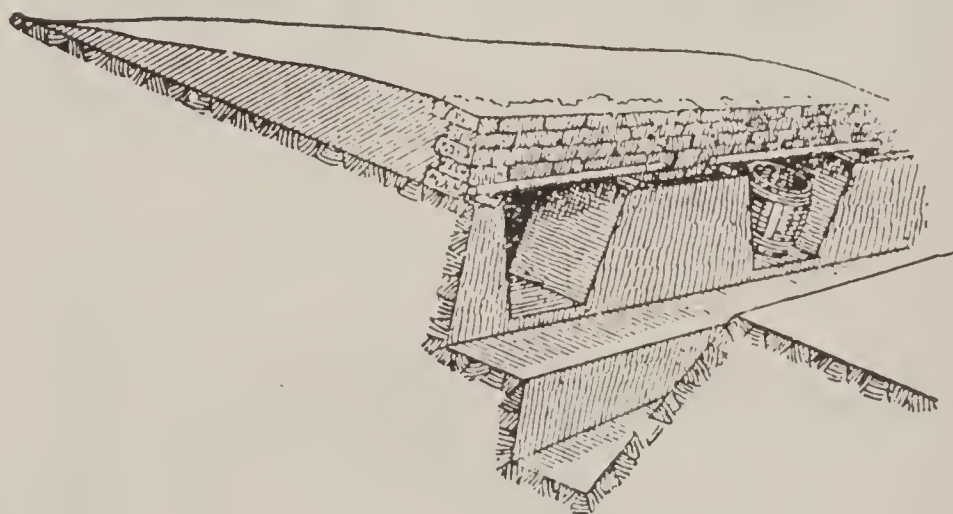


Fig. 18

Store Recesses for Water, Hand-grenades, Reserve Ammunition, Machine Guns, Range-Finders, Blankets, etc. (From *Field Entrenchments*—Solano.)

the effect of shells, bombs or grenades, which burst inside of the trench. The traverses should be wide enough to screen the full width of the trench with a little to spare. The thickness of the traverse varies from 3 to 6 feet or more. Six feet is the dimension gener-

ally found in the traverses in the trenches on the European battle fronts.

239. Trench recesses; sortie steps. It will be noted that in some of the diagrams of the trenches now being used in the European War the **berm** has been eliminated entirely. The object being to bring the firer closer to the vertical wall thus giving him better protection from shrapnel fire. There have also been added to the trench, recesses for hand grenades. These recesses are similar to recesses dug in the front wall of the trench for ammunition. One form of recess is shown in (Fig. 18). In order to provide facilities for rapidly mounting from the trench to charge, sortie steps and stakes have been provided in some trenches as shown in (Fig. 16).

240. Parados. Instead of shrapnel, explosive shell is most frequently used in the European War. This necessitates the addition of a parados to the fire trench to protect against the back blast of high explosives. This is shown in (Figs. 8 and 17).

An interesting development in cover for the firing line is shown in dugouts constructed in the fire trenches in the European War. These dugouts are deep underground and shelter from 3 to 8 men each (Fig. 19). These dugouts will be discussed more in length under cover trenches.

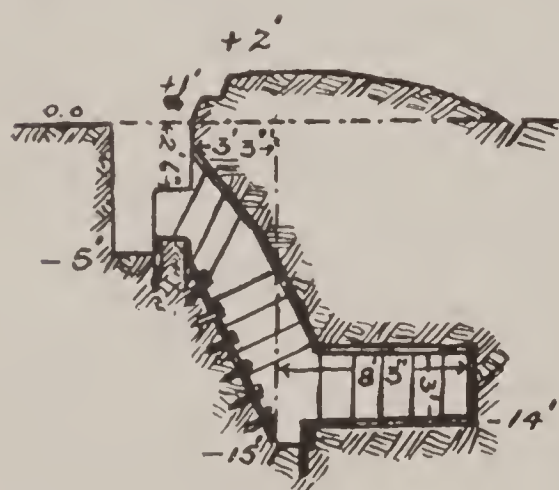


Fig. 19

Head cover is the term applied to any horizontal cover which may be provided above the plane of fire. It is obtained by notching or loopholing the top of the parapet so that the bottoms of the notches or loopholes are in the desired plane of fire. The extra height of parapet may be 12 to 18 inches and the loopholes may be 3 to 3½ feet center to center.

Head cover is of limited utility. It increases the visibility of the parapet and restricts the field of fire.

At close range the loopholes serve as aiming points to steady the enemy's fire and may do more harm than good at longer ranges. This is especially the case if the enemy can see any light through the loophole. He waits for the light to be obscured, when he fires, knowing there is a man's head behind the loophole. A background must be provided or a removable screen arranged so that there will be no difference in the appearance of the loophole whether a man is looking

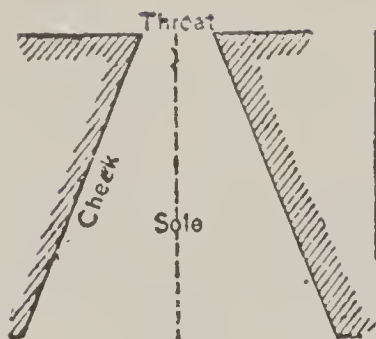


Fig. 20

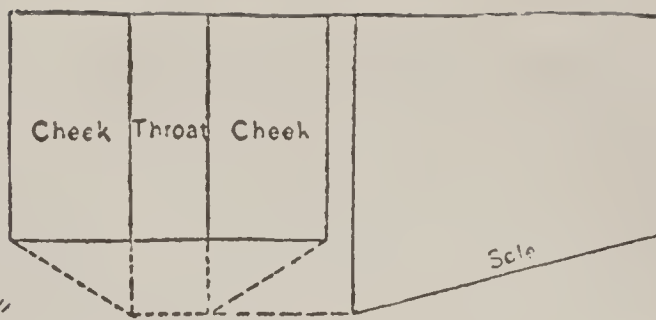


Fig. 21

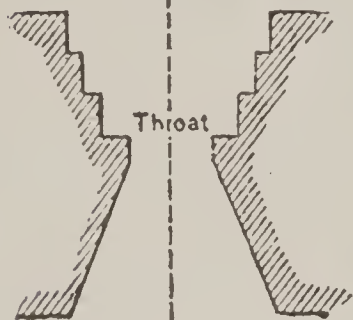


Fig. 22

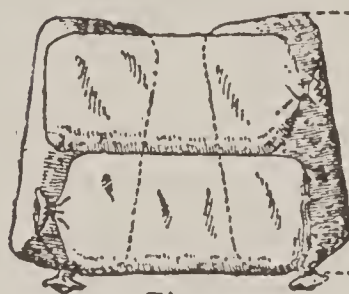


Fig. 23

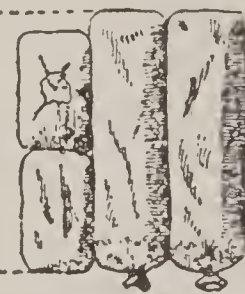


Fig. 24

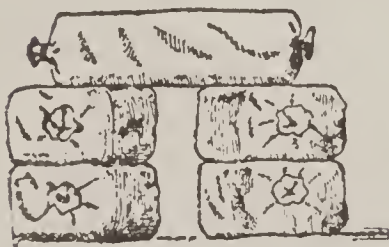


Fig. 25

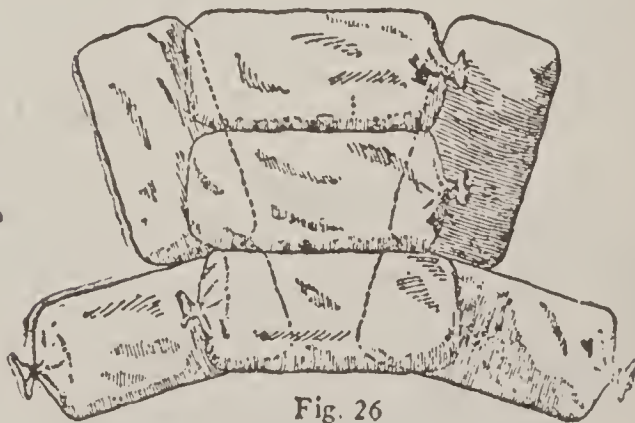


Fig. 26



Fig. 27

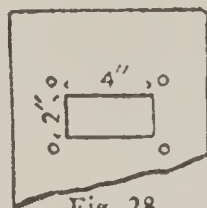


Fig. 28



Fig. 29

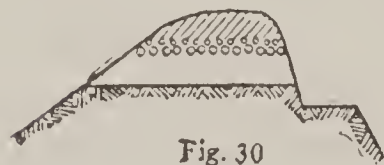


Fig. 30

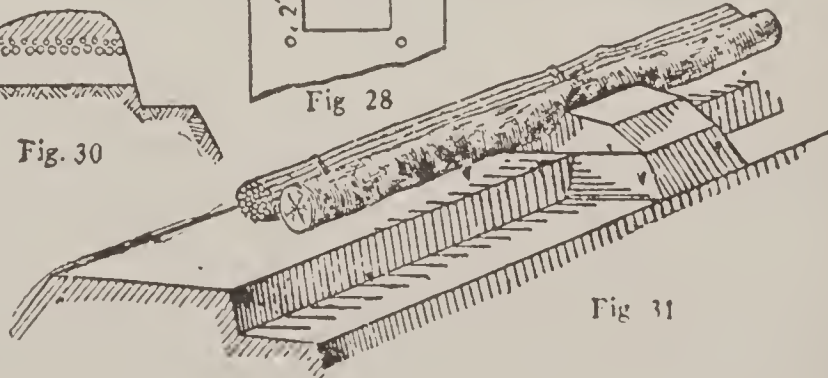


Fig. 31

through it or not. Head cover is advantageous only when the conditions of the foreground are such that the enemy can not get close up.

241. Notches and loopholes, Figs. 20-22, are alike in all respects, except that the latter have a roof or top and the former have not. The bottom, also called **floor** or **sole**, is a part of the original superior slope. The sides, sometimes called **cheeks**, are vertical or nearly so. The plan depends upon local conditions. There is always a narrow part, called the **throat**, which is just large enough to take the rifle and permit sighting. From the throat the sides diverge at an angle, called the **splay**, which depends upon the field of fire necessary.

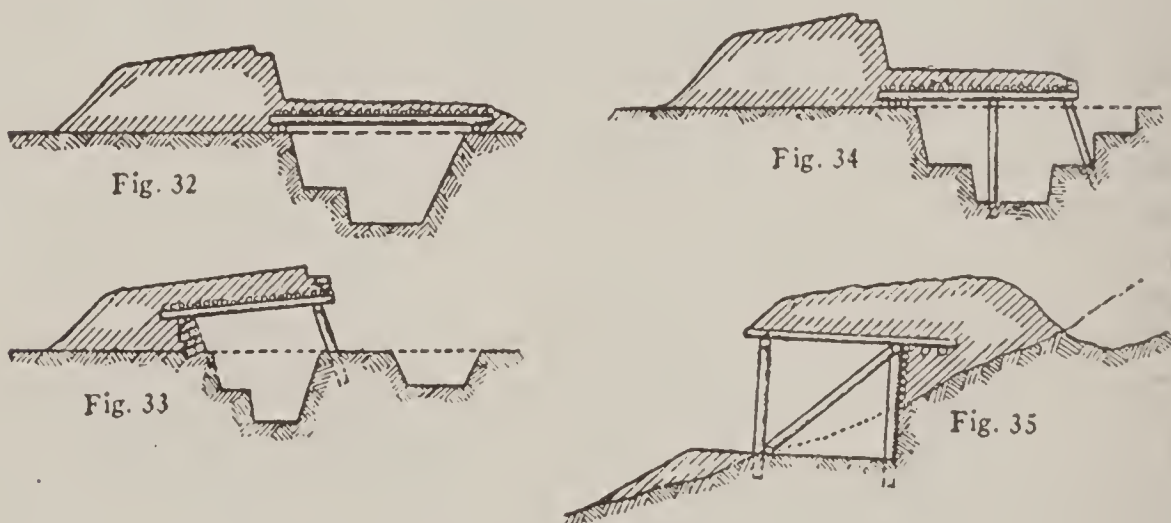
The position of the throat may vary. If on the outside, it is less conspicuous but more easily obstructed by injury to the parapet and more difficult to use, since in changing aim laterally the man must move around a pivot in the plane of the throat. If the material of which the loophole is constructed presents hard surfaces, the throat should be outside, notwithstanding the disadvantages of that position, or else the sides must be stepped as in Fig. 22. In some cases it may be best to adopt a compromise position and put the throat in the middle, Fig. 22. Figs. 23 to 26 show details and dimensions of a loophole of sand bags.

A serviceable form of loophole consists of a pyramidal box of plank with a steel plate spiked across the small end and pierced for fire. Fig. 27 shows a section of such a construction. It is commonly known as the **hopper loophole**. The plate should be $\frac{3}{8}$ in. thick, if of special steel; or $\frac{1}{2}$ in., if ordinary metal. Fig. 28 shows the opening used by the Japanese in Manchuria and Fig. 29 that used by the Russians.

The construction of a notch requires only the introduction of some available rigid material to form the sides; by adding a cover the notch becomes a loophole. Where the fire involves a wide lateral and small vertical angle, loopholes may take the form of a long slit. Such a form will result from laying logs or fascines lengthwise on the parapet, supported at intervals by sods or other material, Fig. 31, or small poles covered with earth may be used, Fig. 30.

242. Overhead cover. This usually consists of a raised platform of some kind covered with earth. It is frequently combined with horizontal cover in a single structure, which protects the top and exposed side. The supporting platform will almost always be of wood and may vary from brushwood or light poles to heavy timbers and plank. It is better, especially with brush or poles, to place a layer of sods, grass down, or straw or grain sacks over the platform before putting on the earth, to prevent the latter from sifting through.

The thickness of overhead cover depends upon the class of fire against which protection is desired, and is sometimes limited by the vertical space available, since it must afford headroom beneath, and generally should not project above the nearest natural or artificial horizontal cover. For splinter proofs a layer of earth 6 to 8 ins. thick on a support of brush or poles strong enough to hold it up will suffice if the structure is horizontal. If the front is higher than the rear, less thickness is necessary; if the rear is higher than the front, more is required. For bombproofs a minimum thickness of 6 ins. of timber and 3 ft. of earth is necessary against field and siege guns, or 12 ins. timber and 6 ft. of earth against the howitzers and mortars of a heavy siege train, not exceeding 6 ins. in caliber.



Types of overhead cover

In determining the area of overhead cover to be provided, allow 6 sq. ft. per man for occupancy while on duty only, or 12 sq. ft. per man for continuous occupancy not of long duration. For long occupation 18 to 20 sq. ft. per man should be provided.

It is not practicable to give complete cover to rifle positions that will successfully withstand the heavy artillery of today. The use of overhead cover is usually limited to that sufficient for protection against rifle fire, machine gun fire and shrapnel.

243. Cover trenches are constructed to provide safe cover for the supports or reinforcements of the fire trenches or to provide cooking and resting facilities for the garrison of the neighboring fire trenches. The important point in cover trenches is safety. They vary in design from the simple rectangular trenches to elaborately

constructed trenches having overhead cover, kitchens, shelters, latrines, dressing stations, etc. Cover trenches must not be mistaken for a secondary position, they are cover for the firing line, supports and reserves until they are required in the fire trenches. The cover trench requires a depth of at least 6 feet to protect men standing. Greater depths may be used when necessary. Fig. 36 is a section of an open cover trench and Fig. 37 of a closed one. This section may be used for a communi-

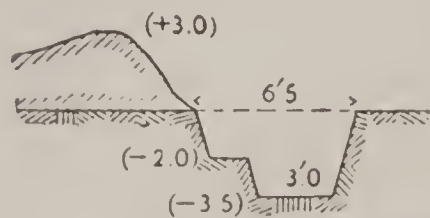


Fig. 36

cating trench.

Fig. 38 shows a cover trench close to a fire trench. The character of overhead cover for trenches is

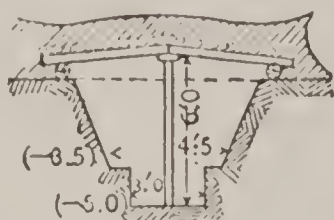


Fig. 37



Fig. 38

shown in the diagrams under overhead cover. The distance of the cover trenches varies with the situation. The experience of the European War places the cover trenches from 15 to 50 yards in rear of the fire trenches. These trenches furnish shelter for at least $\frac{2}{3}$ of the firing line and supports.

The reserves are furnished yet more elaborate shelter, with plenty of room for the men to lie down and rest and when practicable, bathing facilities are provided.

244. Dugouts. An elaborate system of dugouts has developed along the lines occupied by the troops in the European War. These dugouts are located from 14 to 40 feet below the ground and are reached by stairs in timbered passage ways. At the foot of the stairs a tunnel or corridor runs forward and on either side or at the end, rooms have been dug out varying in size. Most of these rooms have been timbered and lined. Many are electrically lighted. In some of these underground shelters, accommodations for several hundred men have been prepared with all of the necessary facilities for making them comfortable. It must be understood that such elaborate preparations can only be made when troops face each other in trenches where operations have developed into practically a siege.

245. Communicating trenches. These trenches as the name implies are for the purpose of providing safe communication between the cover and fire trenches. They may be also constructed just in rear of a series of fire trenches to provide a means of communication from

one to the other. Communicating trenches also extend to the rear of the cover trenches and provide safe passage to fresh troops or supplies. These trenches are usually laid out in zig zag or curved lines (Fig. 39), to prevent enfilade fire from sweeping them. As a general rule excavated earth is placed on both sides of the trench to afford pro-

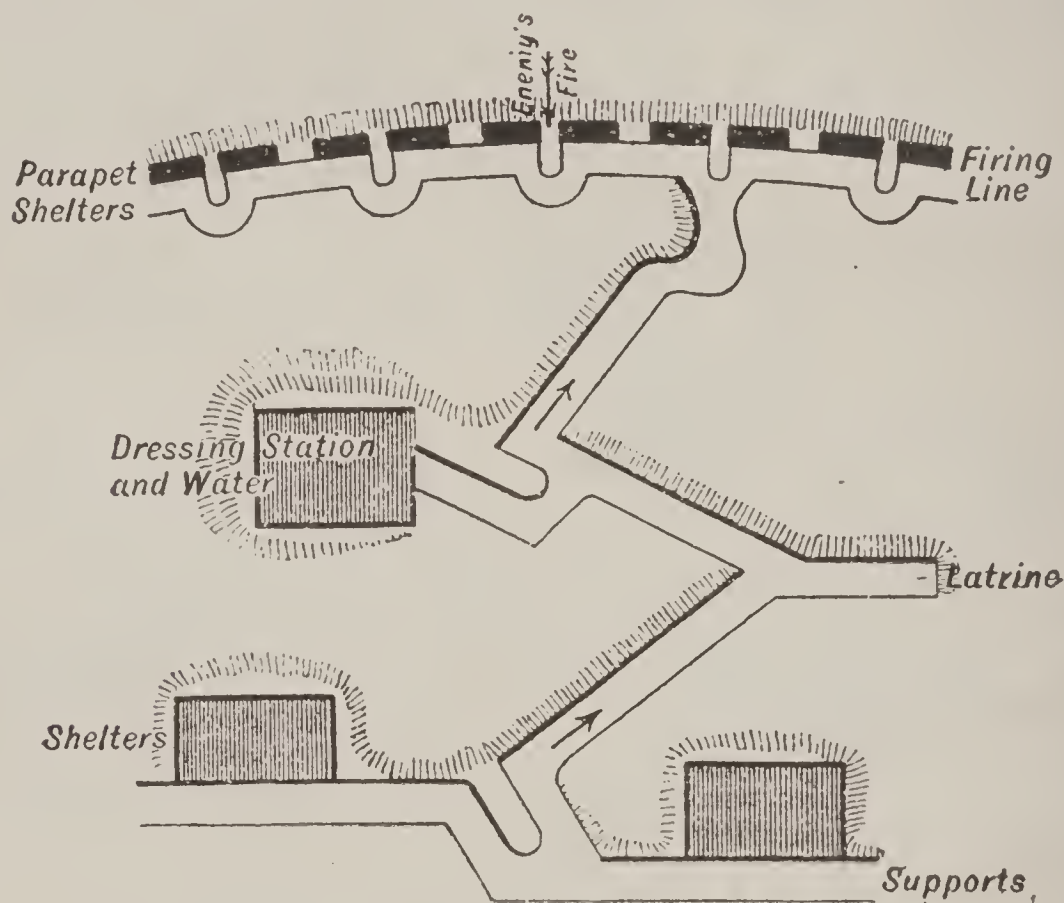


Fig. 39

Typical Passage Trench from Supports to Firing-line.
(From *Field Entrenchments*—Solano.)

tection, the depth is usually from 6 to 7 feet. (Fig. 15) shows a typical communicating trench.

246. Lookouts. To enable the garrison of a trench to get the greatest amount of comfort and rest, a *lookout* should be constructed and a sentinel stationed therein.

The simplest form would consist of two sandbags placed on the parapet and splayed so as to give the required view, and carefully concealed.

Better forms may be constructed, with one side resting on the berm by using short uprights with overhead cover, a slit on all sides being provided for observation.

At night, lookouts are usually posted at listening points located in or beyond the line of obstacles. These will be discussed under obstacles.

247. Supporting Points. In some cases small supporting points may have to be established close behind the general line of trenches for the purpose of breaking up a successful attack on the trenches and to aid in delivering a counter attack. These points are strongly entrenched and have all around wire entanglements and are garrisoned by from 20 to 40 picked men or by larger forces if the situation demand it. In some cases machine guns are added to the force in the supporting point.

248. Example of trench system. Having discussed trenches and obstacles somewhat in detail, let us take a combination of the whole

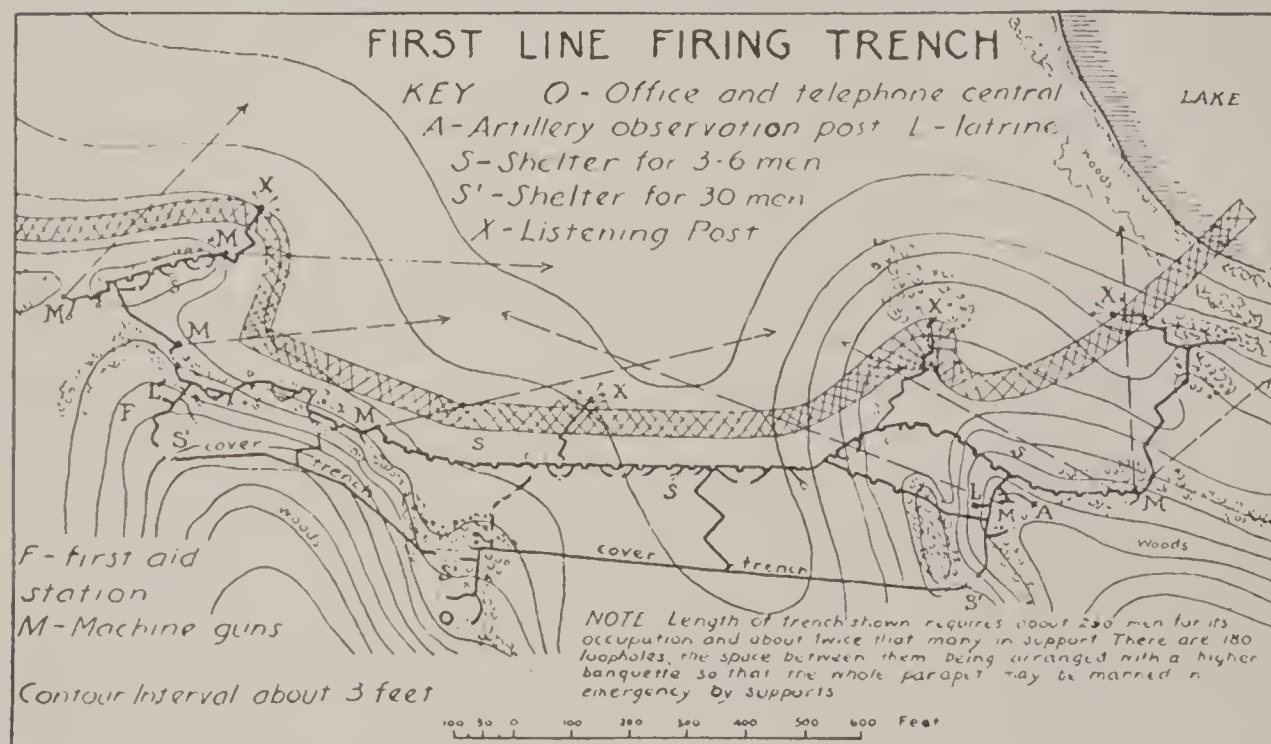


Fig. 40

showing a complete system such as is used today. (Fig. 40) is a good example.

Beginning at the front we have the line of wire entanglements or obstacles with their listening posts X, for guarding them. Connecting the listening posts to the fire trenches are the communicating trenches. The fire trenches are shown by the heavy black line running about 60 feet in rear of the obstacles. Note the many traverses shown by the indentations in the line. Points marked M with arrows projecting to

the flanks are machine guns, so located as to sweep the front of the position with a cross fire. Points marked S are underground shelters for from 3 to 6 men. Points marked S' are shelters for 30 men. In rear of the firing trenches at a distance varying from 100 to 200 feet is the line of cover trenches. This line is connected with the fire trenches by the zig zagged line of communicating trenches. Note that the latrines (L) and first aid stations (F) are just off from the communicating trenches, while the larger shelters for men (S') are near the cover trenches. As the note on the diagram shows, the trench requires 250 men to occupy it with double that number in support. The trench has 108 loopholes with spaces between provided with a higher banquette so that the whole parapet may be manned for firing.

On the battlefields of Europe today there are generally three lines of fire trenches. This permits the defender to fall back to a 2nd or 3rd prepared position in case he is driven out of his first trench. On a hill we find a fire trench near the foot of the slope, one just forward of the military crest and the third on the reverse slope of the hill.

In many instances the first line trenches consist of as many as four or five lines of trenches running in a general lateral direction and connected by deep narrow communicating trenches. The depth between the first and last of these trenches is, in some instances, not over a hundred yards. Sign boards are necessary at short intervals to prevent the soldiers from getting lost. The effect of having so many alternative firing trenches is to make it extremely difficult for an enemy to advance from, or even to hold one of them, even when he gains a footing, as he would be swept by fire from the supporting trenches in rear and also by flanking fire from the adjacent trenches.

249. Location. There are two things to be considered in locating trenches: (1) The tactical situation, and (2) the nature of the ground. The first consideration requires that the trenches be so located as to give the best field of fire. Locating near the base of hills possesses the advantage of horizontal fire, but, as a rule, it is difficult to support trenches so located and to retreat therefrom in case of necessity. While location near the crest of hills—on the “military crest”—does not possess the advantage of horizontal fire, it is easier to support trenches so located and to retreat therefrom. Depending upon circumstances, there are times when it will be better to intrench near the base of hills and there are other times when it will be better to intrench on the “military crest,” which is always in front of the natural crest. The construction of trenches along the “military crest” does not give any “dead space”—that is, any space to the front that can not be reached by the fire of the men in the trenches.

Whether we should construct our trenches on high or low ground is a matter that should always be carefully considered under the particular conditions that happen to exist at that particular time, and the matter may be summarized as follows:

The advantages of the high ground are:

1. We can generally see better what is going on to our front and flanks; and the men have a feeling of security that they do not enjoy on low ground.

2. We can usually reënforce the firing line better and the dead and wounded can be removed more easily.

3. The line of retreat is better.

The disadvantages are:

1. The plunging fire of a high position is not as effective as a sweeping fire of a low one.

2. It is not as easy to conceal our position.

The advantages of low ground, are:

1. The low, sweeping fire that we get, especially when the ground in front is fairly flat and the view over the greater part of it is uninterrupted, is the most effective kind of fire.

2. As a rule it is easier to conceal trenches on low ground, especially from artillery fire.

3. If our trenches are on low ground, our artillery will be able to find good positions on the hill behind us without interfering with the infantry defense.

The disadvantages are:

1. As a rule it will be more difficult to reënforce the firing line and to remove the dead and wounded from the trenches.

2. On a low position there will usually be an increase of dead space in our front.

3. The average soldier acting on the defensive dreads that the enemy may turn his flank, and this feeling is much more pronounced on low ground than on high ground. Should the enemy succeed in getting a footing on our flank with our trenches on top of the hill, it would be bad enough, but it would certainly be far worse if he got a footing on top of the hill, on the flank and rear, with our company on low ground in front. We, therefore, see there are things to be said for and against both high and low ground, and the most that can be said without examining a particular piece of ground is: Our natural inclination is to select high ground, but, as a rule, this choice will reduce our fire effect, and if there is a covered approach to our fire

trenches and very little dead ground in front of it, with an extensive field of fire, there is no doubt the lower ground is better. However, if these conditions do not exist to a considerable degree, the moral advantage of the higher ground must be given great weight, especially in a close country.

The experience of the European War emphasizes the fact that the location of rifle trenches is today, just as much as ever, a matter of compromise to be determined by sound judgment on the part of the responsible officers. The siting of trenches so that they are not under artillery observation is a matter of great importance, but it has yet to be proven that this requirement is more important than an extensive field of fire. There are many instances where to escape observation and fire from the artillery, trenches were located on the reverse slopes, giving only a limited field of fire. This restricted field of fire permitted the enemy to approach within a few hundred yards of the trench and robbed them of the concealment they had hoped to gain. The choice between a site in front, and one in rear of a crest, is influenced by local conditions which govern the effectiveness of our own and the enemy's fire. In general, the best location for effective fire trenches lies between the military crest of rising ground and the lowest line from which the foreground is visible. If the position on the military crest is conspicuous, it is inadvisable.

With regard to the nature of the ground, trenches should, if practicable, be so located as to avoid stony ground, because of the difficult work entailed and of the danger of flying fragments, should the parapet be struck by an artillery projectile.

To locate the trace of the trenches, lie on the ground at intervals and select the best field of fire consistent with the requirements of the situation.

Trenches should be laid out in company lengths, if possible, and adjoining trenches should afford each other mutual support. The flanks and important gaps in the line should be protected by fire trenches echeloned in rear.

250. Concealment of trenches. Owing to the facilities for observation that the aeroplanes and other air craft afford, and to the accuracy and effect of modern artillery fire, every possible means should be taken to conceal trenches, gun placements, and other works. The aim should be to alter the natural surface of the ground as little as possible and to present a target of the smallest possible dimensions. Covering the parapet with brush or grass will afford temporary concealment. If the new earth can be sodded it aids greatly in

concealing the trench. In some cases troops have gone to the extent of painting canvas to resemble the ground and have placed it over trenches, guns, etc. Straw and grass placed in the bottom of trenches make them less conspicuous to air scouts. When trenches are dug on a fairly steep slope care must be used to conceal the back of the trench, which, being higher than the parapet, will stand out as a scar on the hillside. Grass or brush may be used to conceal the back of the trench.

251. Dummy trenches. May be constructed which attract the enemy's attention and draw his fire, or at least a part of it. The extent to which this method may be used may include the construction of dummy obstacles and guns, and even hats may be placed on the parapets.

252. Length of trench. The usual minimum allowance of trench space is one yard per man, although in some tests, two feet was found sufficient for men to fire satisfactorily. Ordinarily one squad will occupy the space between two traverses which experience has shown should be about 15 feet apart.

253. Preparation of the foreground. One of the first principles in improving the foreground is that an enemy attacking the trenches shall be continually exposed to fire especially in the last 400 or 500 yards. This requires a clearing of the foreground and a filling in of depressions or leveling of cover. Dead space may be swept by fire of trenches specially located for that purpose. Those features of the ground which obstruct the field of fire, restrict the view or favor the enemy's approach, should be removed as fast as possible. On the other hand, features which favor the concealment of the trenches or increase the difficulty of the attack would better be left standing, especially when it is possible to fire through or over them.

254. Revetments. By a revetment we mean a facing placed against the front or back wall of a trench to keep the earth in place.

When trenches are to be occupied for any length of time, they must be revetted. There are many forms of revetments. Sod revetments, stakes with brush behind them, stakes with planks, boards, or poles behind them and a common form seen in the trenches in Europe—chicken wire with brush or canvas behind it.

255. Drainage. All trenches should be dug so as to drain in case of rain. In favorable locations the trench may be constructed to drain automatically, by constructing it with an incline to one end. Under ordinary circumstances dry standing has to be provided in

trenches by raising the foot level by the use of brush, boards, poles, etc. Bailing will have to be resorted to in most cases to drain the trench.

256. Water supply. At least $\frac{1}{2}$ a gallon of water per man per day should be supplied. The supply is almost invariably liable to be contaminated, therefore, it should be sterilized by boiling or by treating with chemicals.

257. Latrines. Numerous latrines must be constructed in the trenches. These are usually located just off from the communicating trenches. Some form of receptacle should be used and all deposits covered with earth. These receptacles are removed from time to time and emptied in pits dug for that purpose. Urinal cans must also be provided and cared for in a similar manner.

258. Illumination of the foreground. Battlefield illumination is a necessity where night attacks may be expected, and also as a protection to the line of obstacles. Portable searchlights have become an accepted part of every army. In addition to these, trenches must be supplied with reflector lights, star bombs, rockets and flares, arranged so that they can be put into action instantaneously when the enemy approaches.

The foreground should be entirely illuminated, leaving the defenders in the shadow. If the light is too close to the defenders' parapet, they are illuminated and become a good target. Some flares will burn for 20 minutes and may be thrown to the front as grenades, fired as rockets, shot from small mortars, or placed well to the front to be set off by trip wires close to the ground. The best light devised is one that can be fired well to the front from a small mortar and then hung suspended from an open parachute above the enemy. Bonfires can be laid ready for lighting when no other means is at hand. Whatever form of illumination is adopted, it should withstand bad weather conditions and prolonged bombardment.

259. Telephones. When armies have been forced to trench warfare and time has permitted an elaborate system of trenches to be constructed, telephone communication is established as soon as possible. The central station, with the switch-board, is located in a shelter in rear of the cover trenches and lines are run to all trenches, lookout stations and listening points.

260. Siege works. Comprise devices used by besiegers and besieged in attack and defense of strong fortifications and especially those devices that enable troops to advance under continuous cover.

CHAPTER XVIII

OBSTACLES

261. Object. The main objects in placing obstacles in front of the trenches are, to protect them from surprise, and to stop the enemy's advance or to delay him while under the defender's fire.

262. Necessity for obstacles. It is evident that the present tendency is to reduce the number of men assigned to constant occupancy of the first line trenches. This is due to the effectiveness of rifle fire at close range, the destructive effect of shell and shrapnel, the infrequency of daylight attack on intrenched positions, and the severe strain on the men. The aim seems to be the placing here and there of a lookout or trench guards, who, when necessity demands can call help from the near-by splinter-proofs, dugouts, etc., before the enemy can make his way through the obstacles. It has been found from experience in the European War that as long as shells are directed at the trenches no danger of attack is feared but, when the shells are concentrated against the obstacles the trenches are manned and preparations are made to resist an assault.

263. Location. Obstacles must be so located that they will be exposed to the defenders' fire, and should be sheltered as far as possible from the enemy's artillery fire. They should be difficult to remove or destroy, should afford no cover for the enemy, and should not obstruct counter attacks. No obstacle should be more than 100 yards from the defender's trench. Care must be taken not to place them so close to the trench that hand grenades can be thrown into the trench from beyond the obstacle. Obstacles may be placed in one, two or three lines. As far as possible they should be concealed so that they will not betray the location of the trench.

264. Kinds of Obstacles. The following are the most common kinds of obstacles:—

Abatis consisting of trees lying parallel to each other with the branches pointing in the general direction of approach and interlaced. All leaves and small twigs should be removed and the stiff ends of branches pointed.

Abatis on open ground is most conveniently made of branches about 15 feet long. The branches are staked or tied down and the butts anchored by covering them with earth. Barbed wire may be interlaced among the branches. Successive rows are placed, the branches of one extending over the trunks of the one in front, so as to make the abatis 5 feet high and as wide as desired. It is better to place the abatis in a natural depression or a ditch, for concealment and protection from fire. If exposed to artillery, an abatis must be protected either as above or else by raising a glacis in front of it. Fig. 1 shows a typical form of abatis with a glacis in front. An abatis formed by felling trees toward the enemy, leaving the butt hanging to the stump, the branches prepared as before, is called a **slashing**, Fig. 2. It gives cover, and should be well flanked.

265. A palisade is a man-tight fence of posts. Round poles 4 to 6 inches in diameter at the large end are best. If the sticks run 5 to 8 inches, they may be split. If defended from the rear, palisades give some shelter from fire and the openings should be made as large as possible without letting men through. If defended from the flank, they may be closer, say 3 to 4 inches apart. The top should be pointed. A strand or two of barbed wire run along the top and stapled to each post is a valuable addition.

Palisading is best made up in panels of 6 or 8 feet length, connected by a waling piece, preferably of plank, otherwise of split stuff. If the tops are free, two wales should be used, both underground. If the tops are connected by wires, one will do.

Palisades should be planted to incline slightly to the front. As little earth should be disturbed in digging as possible, and one side of the trench should be kept in the desired plane of the palisade. If stones can be had to fit between the posts and the top of the trench, they will increase the stiffness of the structure and save time in ramming, or a small log may be laid in the trench along the outside of the posts. Figs. 3 and 4 show the construction and placing of palisades.

266. A fraise is a palisade horizontal, or nearly so, projecting from the scarp or counterscarp. A modern and better form consists of supports at 3 or 4 feet interval, connected by barbed wire, forming a horizontal wire fence. Fig. 5.

267. Chevaux de frise are obstacles of the form shown in Fig. 6. They are usually made in sections of manageable length chained together at the ends. They are most useful in closing roads or other narrow passages, as they can be quickly opened for friendly troops.

The lances may be of iron instead of wood and rectangular instead of round; the axial beam may be solid or composite. Figs. 8 and 9 show methods of constructing chevaux de frise with dimension stuff.

268. A formidable obstacle against cavalry consists of railroad ties planted at intervals of 10 feet with the tops $4\frac{1}{2}$ feet above the ground, and connected by a line of rails spiked securely to each, Fig. 7. The rail ends should be connected by fish plates and bolted, with the ends of the bolts riveted down on the ends.

Figs. 10 and 11 show forms of heavy obstacles employed in Manchuria by the Russians and Japanese, respectively. The former is composed of timber trestles, made in rear and carried out at night. The latter appears to have been planted in place.

269. A wire entanglement is composed of stakes driven in the ground and connected by wire, barbed is the best, passing horizontally or diagonally, or both. The stakes are roughly in rectangular or quincunx order, but slight irregularities, both of position and height should be introduced.

In the **high entanglement** the stakes average 4 feet from the ground, and the wiring is horizontal and diagonal, Fig. 12.

The **low wire entanglement** has stakes averaging 18 inches above the ground and the wire is horizontal only. This form is especially effective if concealed in high grass. In both kinds the wires should be wound around the stakes and stapled and passed loosely from one stake to the next. When two or more wires cross they should be tied together. Barbed wire is more difficult to string but better when done. The most practicable form results from the use of barbed wire for the horizontal strands and smooth wire for the rest.

This is the most generally useful of all obstacles because of the rapidity of construction, the difficulty of removal, the comparatively slight injury from artillery fire, and its independence of local material supplies.

270. Time and materials. One man can make 10 sq. yds. of low and 3 sq. yds. of high entanglement per hour. The low form requires 10 feet of wire per sq. yd. and the high 30 feet. No. 14 is a suitable size. The smooth wire runs 58.9 ft. to the lb. A 100-lb. coil will make 600 sq. yds. of low or 200 sq. yds. of high entanglement. If barbed wire is used, the weight will be about $2\frac{1}{2}$ times as much.

271. Wire fence. An ordinary barbed-wire fence is a considerable obstacle if well swept by fire. It becomes more formidable if a ditch is dug on one or both sides to obstruct the passage of wheels

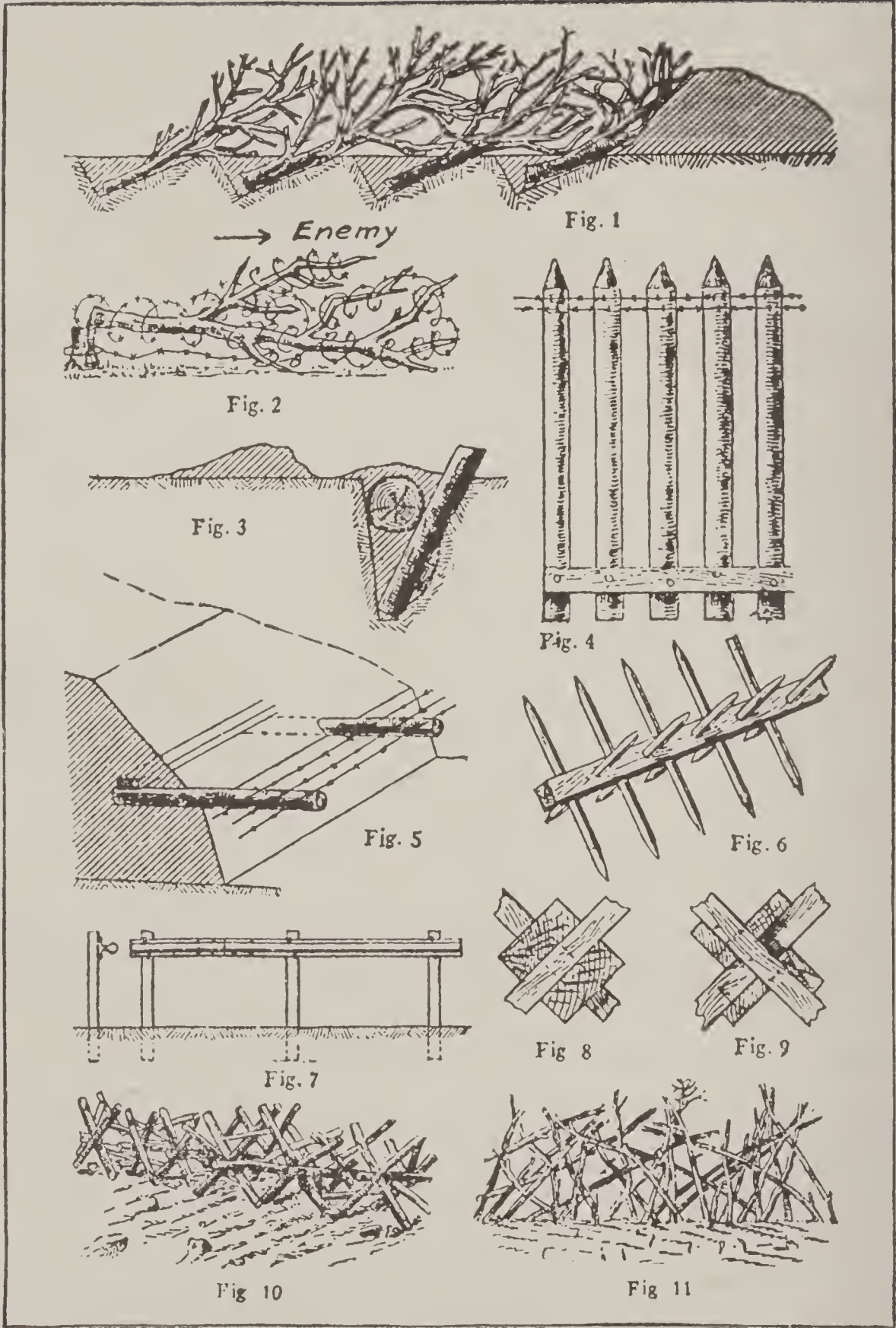


Plate I

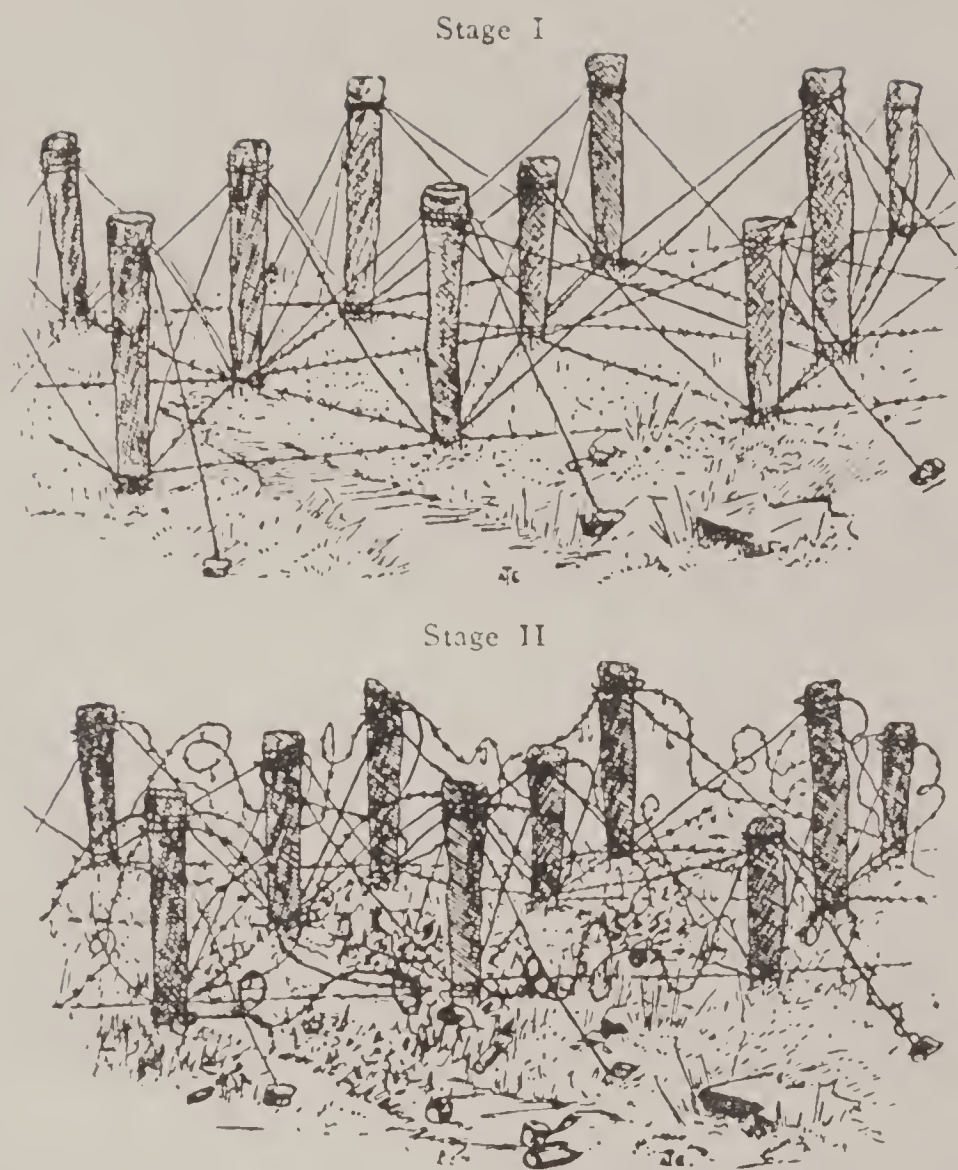


Fig. 12

High wire entanglement, showing method of linking posts head to foot and foot to head. Wire, plain or barbed, then festooned with barbed wire. Bind wires where they cross. Use broken bottles, crows feet, planks with spikes or fishhooks in conjunction with this entanglement. (From *Knowledge of War*—Lake.)

after the fence has been cut. The fence is much more difficult to get through if provided with an apron on one or both sides, inclined at an angle of about 45° , as indicated in Figs. 13 and 14. This form was much used in South Africa for connecting lines between blockhouses. When used in this way the lines of fence may be 300 to 600 yds. long, in plan like a worm fence, with the blockhouse at the reëntrant angles. Fixed rests for rifles, giving them the proper aim to enfilade the fence, were prepared at the blockhouses for use at night.

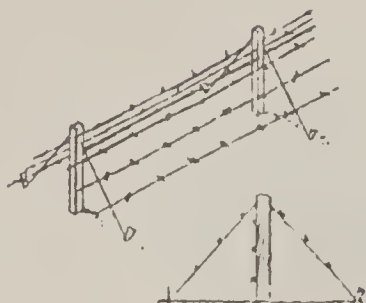


Fig. 13



Fig. 14

Such a fence may be arranged in many ways to give an automatic alarm either mechanically or electrically. The mechanical forms mostly depend on one or more single wires which are smooth, and are tightly stretched through staples on the posts which hold them loosely, permitting them to slip when cut and drop a counter-weight at the blockhouse, which in falling explodes a cap or pulls the

trigger of a rifle.

272. Military pits or trous de loup are excavations in the shape of an inverted cone or pyramid, with a pointed stake in the bottom. They should not be so deep as to afford cover to the skirmisher. Two and one-half feet or less is a suitable depth. Fig. 15 shows a plan and section of such pits.

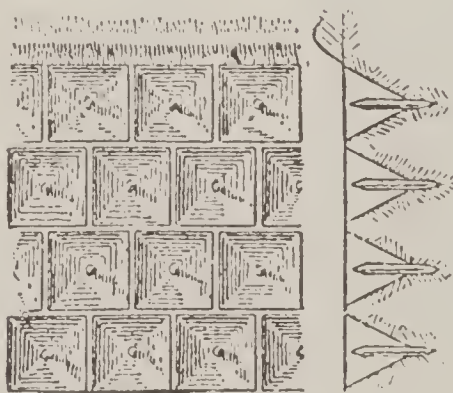


Fig. 15

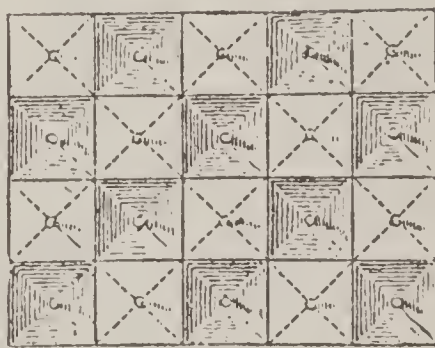


Fig. 16

They are usually dug in 3 or 5 rows and the earth thrown to the front to form a glacis. The rear row is dug first and then the next in front, and so on, so that no earth is cast over the finished pits.

An excellent arrangement is to dig the pits in a checkerboard plan, leaving alternate squares and placing a stake in each of them to form a wire entanglement, Fig. 16. One man can make 5 pits on a 2-hour relief.

273. Miscellaneous barricades. Anything rigid in form and movable may be used to give cover from view and fire and to obstruct the advance of an assailant. Boxes, bales and sacks of goods, furniture, books, etc., have been so used. The principles above stated for other obstacles should be followed, so far as the character of the materials will permit. The rest ingenuity must supply. Such devices are usually called **barricades** and are useful in blocking the streets of towns and cities.

274. Inundations. Backing up the water of a stream so that it overflows a considerable area forms a good obstacle even though of fordable depth. If shallow, the difficulty of fording may be increased by irregular holes or ditches dug before the water comes up or by driving stakes or making entanglements. Fords have frequently been obstructed by ordinary harrows laid on the bottom with the teeth up.

The unusual natural conditions necessary to a successful inundation and the extent and character of the work required to construct the dams make this defense of exceptional use. It may be attempted with advantage when the drainage of a considerable flat area passes through a restricted opening, as a natural gorge, a culvert, or a bridge.

Open cribs filled with stones, or tighter ones with gravel or earth may form the basis of the obstruction to the flow of water. The usual method of tightening cracks or spaces between cribs is by throwing in earth or alternate layers of straw, hay, grass, earth, or sacks of clay. Unless the flow is enough to allow considerable leakage, the operation will not be practicable with field resources.

When the local conditions permit water to be run into the ditch of a parapet it should always be done.

275. Obstacles in front of outguards should be low so they cannot be seen at night. A very simple and effective obstacle can be made by fastening a single strand of wire to the top of stout stakes about a foot high, and then placing another wire a little higher and parallel to, and about one yard in rear of, the first. The wires must be drawn tight, and securely fastened, and the stakes fairly close together, so that if the wire is cut between any two stakes the remainder will not be cut loose. Any one approaching the enemy will trip over the first wire, and before he can recover himself he will be brought down by the second. In the absence of wire, small saplings may be used instead. Of course, they are not as good as wire, but

it does not take much to trip up a man in the dark.

Lessons from the European War

What follows is based on reports from the battle fronts in Europe.

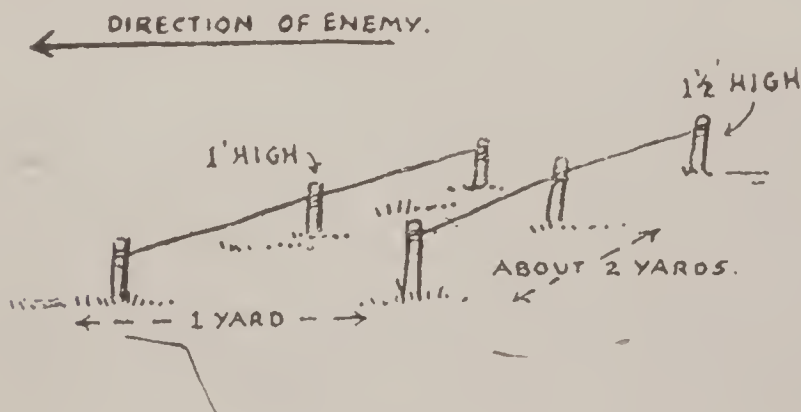


Fig. 17

Wire entanglements. The war in Europe has proven that the wire entanglements are the most important and effective obstacle yet devised. Owing to the intensity of the opposing fire and in many cases to the short distance between the opposing trenches, it has become necessary to construct all forms of obstacles in portable sections which are carried or rolled quickly into place, either by soldiers rushing out in daylight and quickly staking the obstacles down or by placing the obstacles quietly at night.

For placing wire entanglements at night, an iron post has been devised about $\frac{1}{4}$ of an inch in diameter, with eyelets for attaching the wire. The lower 18 inches is made as an auger, so that the posts can be quietly screwed into the ground at night and the wire attached. Another method of placing wire entanglements is to make them in sections and roll them up. These sections are usually about 20 feet long, the wire firmly fastened to the sharpened stakes. At a favorable moment the soldiers rush out, unrolling the sections as they go and with mauls quietly drive the stakes. Loose ends of wire enable the sections to be bound together as placed.

Another form of wire entanglement is shown in (Fig. 18). Triangular pyramids 3 feet 6 inches high are made of poles or timber. The pyramids are usually arranged in pairs with the wire on three faces so that, no matter if the obstacle is rolled over, a wire fence is presented. These obstacles are carried out and placed so as to break joints and are staked down as soon as possible.

Substitute for Posts.

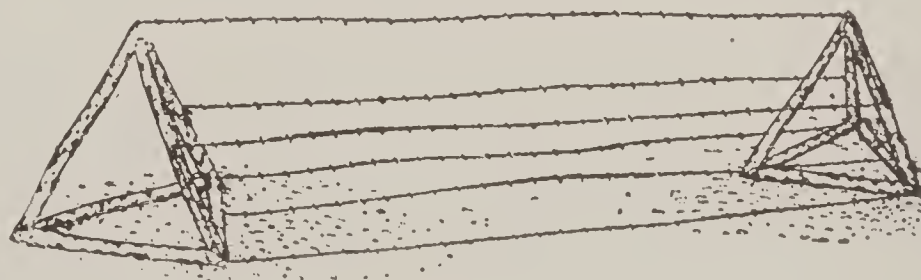


Fig. 18

The wire used for entanglements is found more convenient to handle when wound on a stake a yard in length, in a sort of figure eight winding. Special barbed wire of heavier material and barbs placed close together has been found much more effective than the commercial barbed wire.

In some localities electrified wire has been used. In such cases the obstacle is charged in sections, so that, if one section is grounded it will not affect the others.

276. Wire chevaux de frise. Two forms of this obstacle have appeared. Both are portable. They consist of two or more wooden crosses fastened at their centers to a long pole and connected with each other by barbed wire. This obstacle retains its effectiveness when rolled over. (Figs. 19 and 20) give an idea of their construction. The form shown in (Fig. 19) is often made small enough for individuals to carry. These are prepared in the trenches and used for throwing into one's own entanglements to make them more complex or may be carried when making an assault and thrown into the enemy's trenches to prevent movements from one part of the trench

Wire Chevaux de Frise.



Fig. 19

Wire Chevaux de Frise.

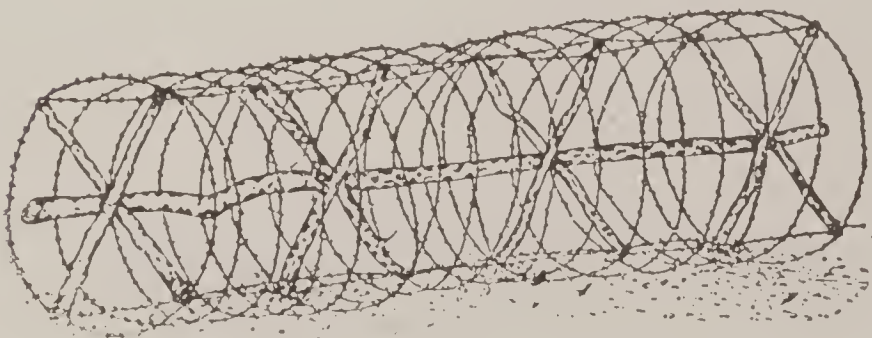


Fig. 20

to another. The long stick projects out of the end to be used as a handle.

277. Guarding obstacles. It has been found necessary to keep a constant watch over obstacles after they have been placed.

278. Listening posts. One of the best methods is to post one or more men in listening posts in or beyond the line of obstacles. These listening posts are rifle pits with over head cover, fully protected from fire from the rear as well as front, and loop holes for observation and fire. They are connected with the fire trenches by

means of a covered communication or even tunnels in some cases and are provided with some form of prompt communication with the firing trenches by telephone, bell or other means. The communicating trench or tunnel is provided with a strong door which may be closed to prevent an enemy from securing access to the fire trench, in case the lookout is surprised. Pits with trap doors are also used to prevent an enemy from creeping up the tunnel to the fire trench.

These lookouts can give early warning of the approach of an enemy, either for the purpose of assault or cutting through the obstacles. In many instances they have detected mining operations of the enemy by hearing the blows of picks under ground.

279. Automatic alarms. Many automatic alarms have been used to give warning of attack on the obstacles. These vary from the simple setting of a pistol or rifle, which is fired when the enemy attempts to cut through the entanglement, to intricate electrical alarms.

280. Searchlights. Searchlights have been provided so that, the instant an alarm is given the obstacles are flooded by a brilliant light and the enemy exposed to fire.

APPENDIX

USEFUL ARTICLES OF FIELD EQUIPMENT



FOLDING CAMP CHAIR

Size folded, 3 feet long by 3 inches square. Weight, 6 pounds. Will support 300 pounds.



FOLDING CAMP TABLE

Top 2 feet 3 inches wide and 3 feet long. Size, folded, 3 feet long by 5 x 7 inches. Weight, 18 lbs. Will support 300 pounds.



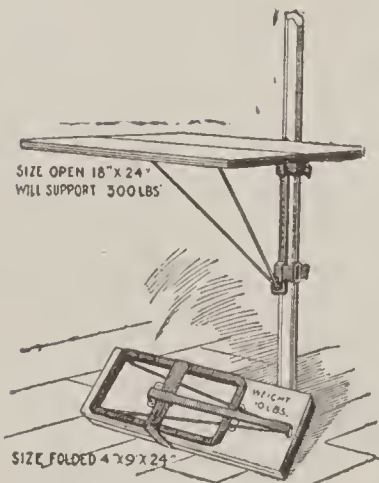
CAMP STOOL.

Folds $2\frac{1}{2}$ inches square, 2 feet long; weight, 2 pounds. Will support 300 pounds.

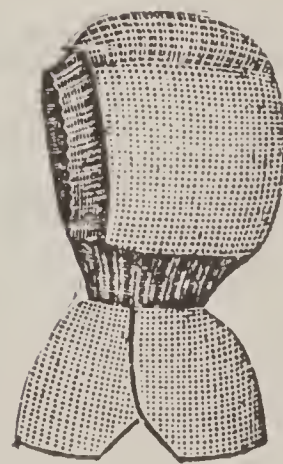


WASH STAND (Rubber Folding)

Folds 2 inches square, 3 feet long; weight, 2 pounds.

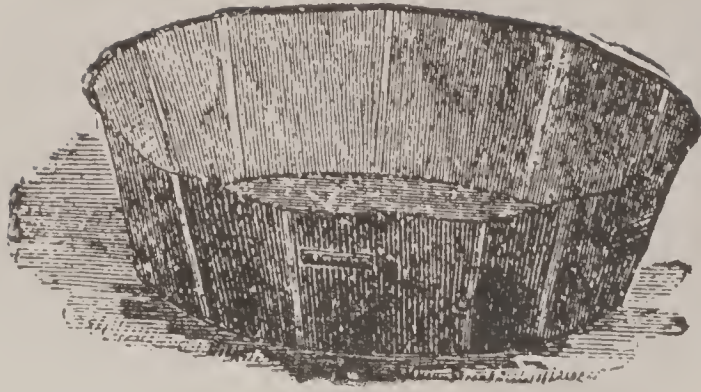


Attach to tent pole.
"SHUR-FOOT" FOLDING CAMP
TABLE



SLEEPING HOOD
Weight, 3 ounces.

BATH TUBS

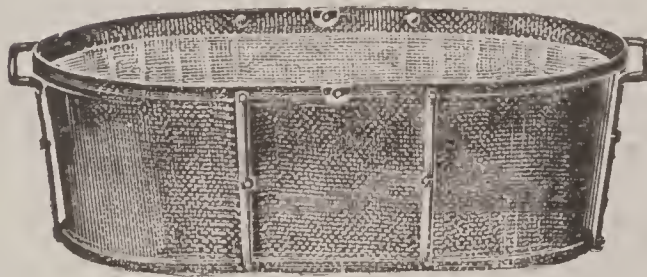


Open

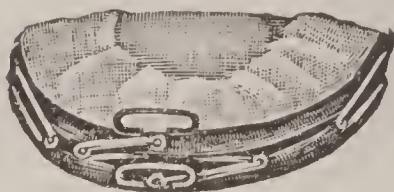


Packed

Rubber, Diameter, 16 inches.



Open



Folded, Double

Canvas, Diameter, 30 inches.



Open



WATER PAIL, No. 1

3 gallons. Weight, 8 ounces.

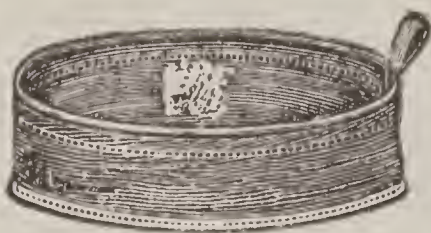


Folded, Double

WASH BASIN, No. 1



Open



WASH BASIN, No. 2

Capacity, 1 gallon. Weight, 7 ounces.



Folded, Double

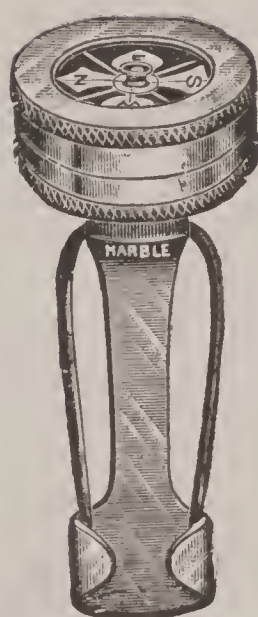
WATER PAIL, No. 2



COMPASS, No. 1



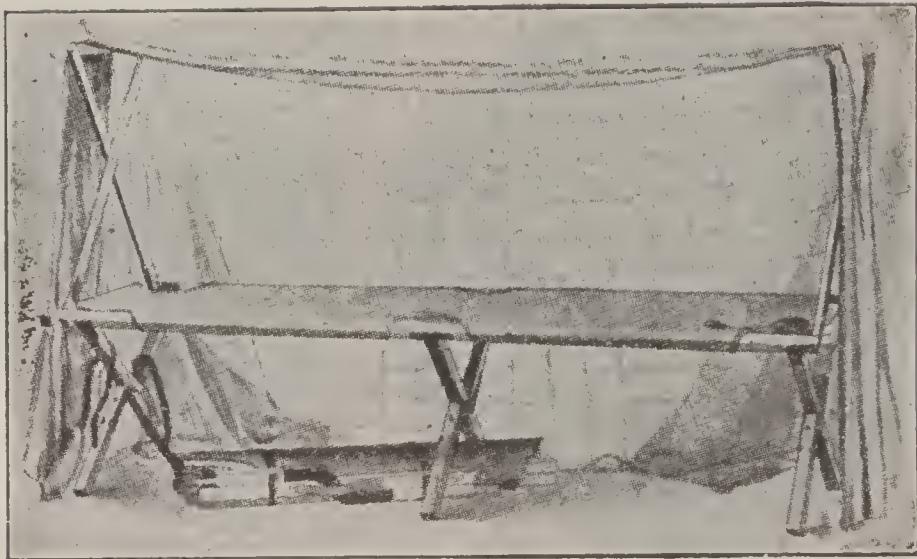
COMPASS, No. 2



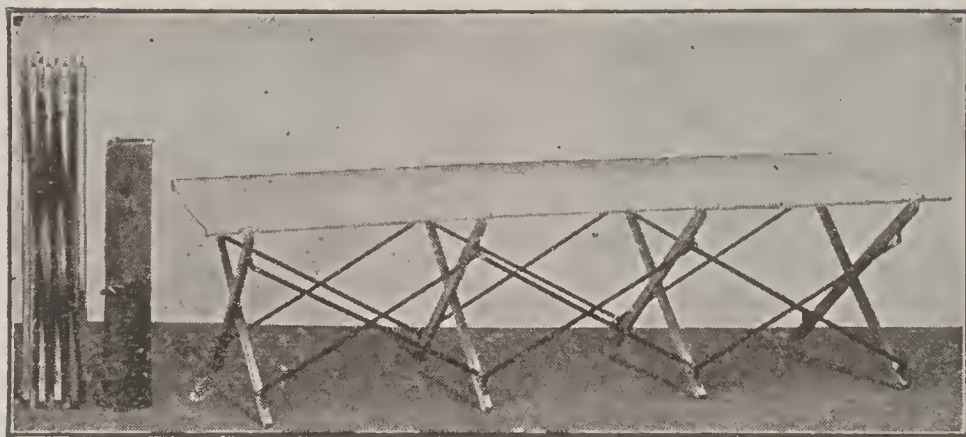
COMPASS, No. 3



MATCH BOX



GOLD MEDAL COT



Folded

Open

TELESCOPE COT

CAMP CANDLESTICKS
Makes Two Candlesticks



Ready for Use



Prepared for Closing

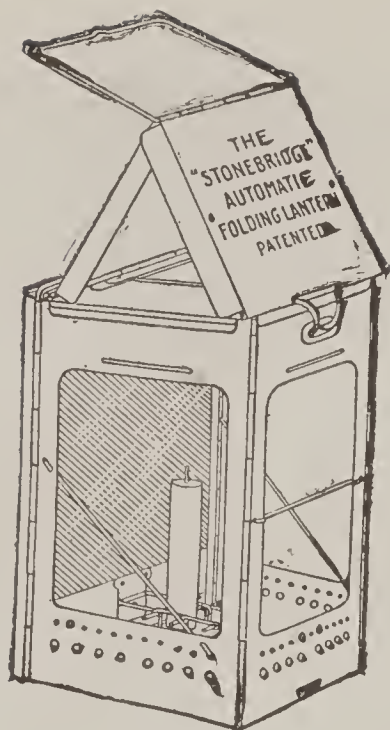


Closed

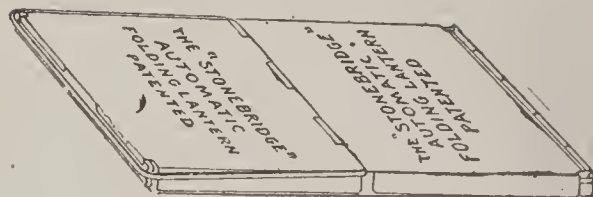


Opened, 11 x 15 inches.

MAP CASE



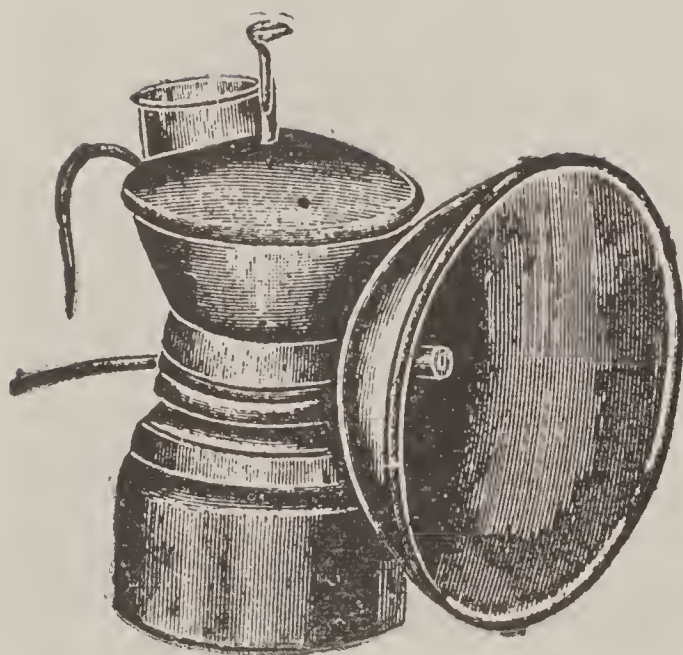
Open



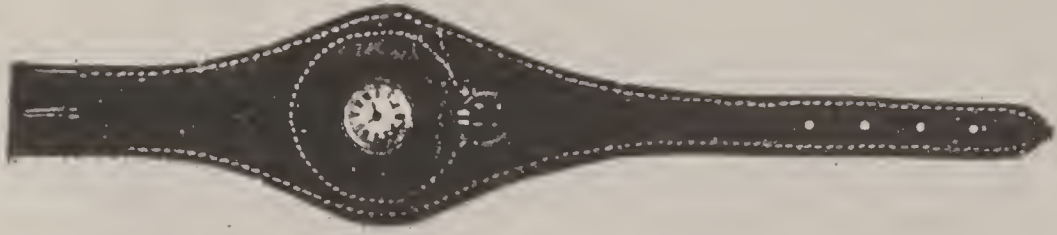
Folded

FOLDING LANTERN

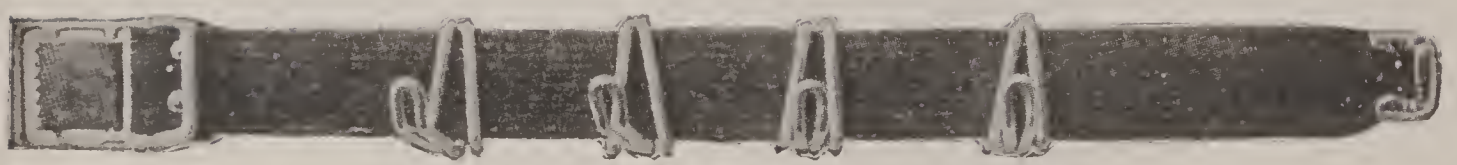
(Sides of mica. Will not blow out.)



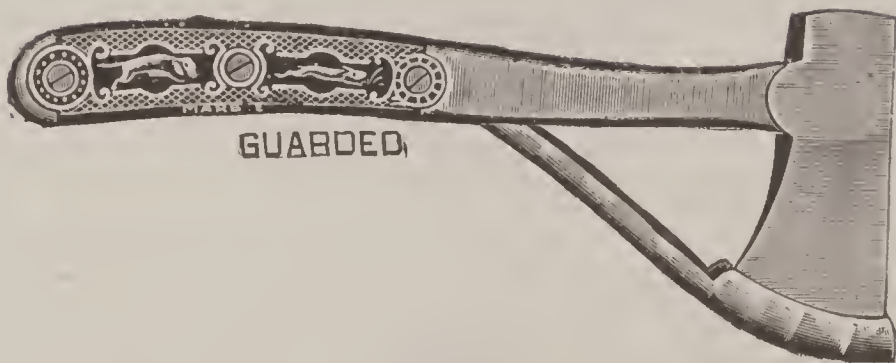
ACETYLENE LAMPS



WATCH BRACELET



WEB TENT CLOTHES HANGER



SAFETY AX

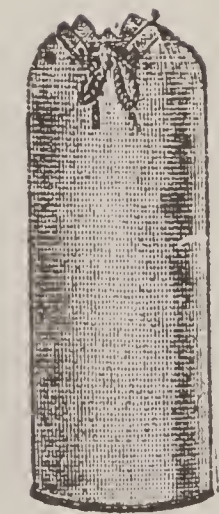


COMBINATION KNIFE



CLOTHES HANGER

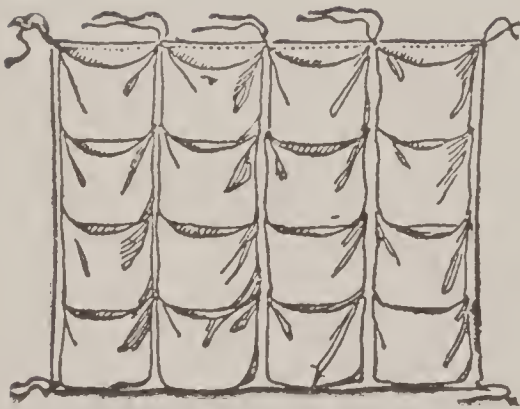
Each hanger has five hooks.



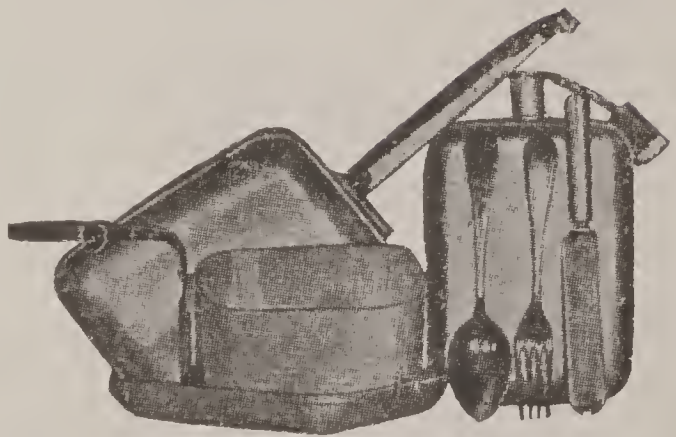
DUFFLE BAG
(Waterproof).



HOUSEWIFE



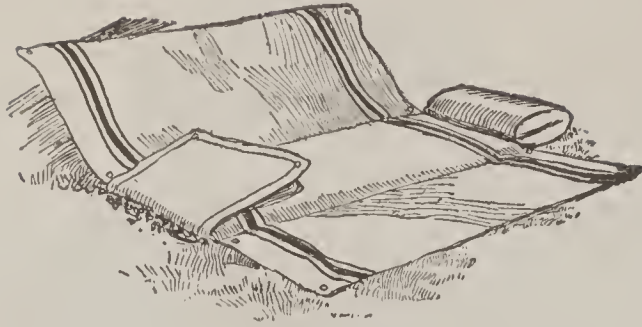
WALL POCKETS



PRESTON MESS KIT

Consists of canteen, frying pan, stew pan, plate, knife, fork and spoon. Size $9\frac{1}{2} \times 6 \times 4$ inches.

CAMP COMBINATION

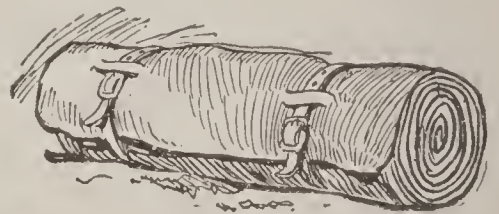


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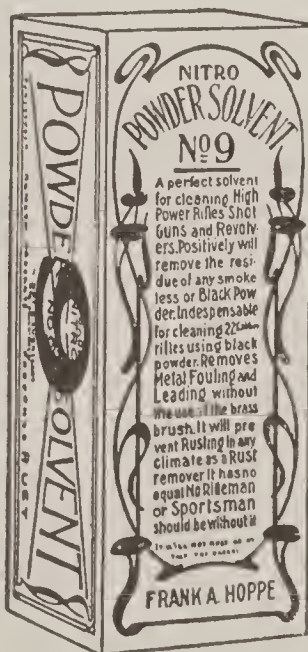
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